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Welcome

For [Android] M, we've gone back to the basics," annouced an eight-foot-high projection of Google head honcho Sundar Pichai in front of me. "We've really focused on polish and quality; we've literally solved thousands of bugs." Watching a live broadcast of Pichai's speech in California from Google's London headquarters, I heard a dozen Android developers around me collectively sigh in relief. After the bold redesign of Android Lollipop, no one was in the mood for another overhaul. Instead, it was all about the small fixes; when Google announced Android M's volume controls would be simplified, we all cheered.

For all its focus on refinement, Google has still managed to pack a lot of exciting new features into its next big update, including Android Pay for mobile payments, Now on Tap for a smarter Google Now experience and free unlimited cloud storage for every user with Google Photos (page 28). Somehow they've managed to do all this and double the battery life of your smartphone.

While Android M doesn't launch until this autumn, find out how to set up the Developer Preview on your Nexus or – for the first time ever – Sony Xperia from page 12. You can also find out how Android is building a smarter home on page six, unfolding the future of virtual reality on page 20, and 10 other Google projects that our going to change the world on page 10.

Jack Parsons

Jack Parsons
Editor

MEET THE TEAM

What feature most excites you about Android M?

Jack Parsons
Editor
Android M's super-smart Now on Tap searching is simultaneously exciting and scary in the way truly revolutionary tech always is.

Jamie Frier
Staff Writer
The app permissions control really is a great move. I'm glad I no longer have to give access to all of my private data to play a game.

Siobhan Maguire
Production Editor
I think Android Pay is a great addition, it really shows how technology has developed, and it will make shopping so much easier!

Adam Markiewicz
Senior Designer
I'm excited to use multiple apps in split-screen mode. I'll be able to text friends, view Google Maps and play games at the same time!

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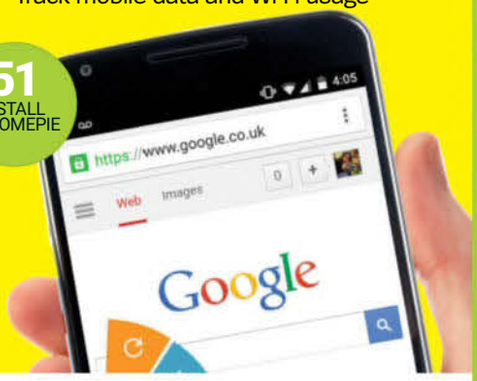

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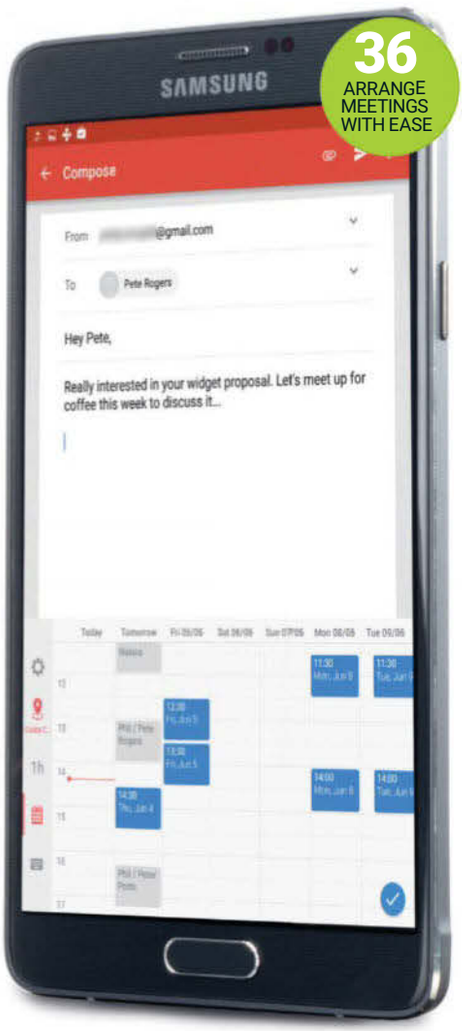


Nest Cam watches over your smart home

After reinventing the thermostat and smoke detector, Nest launches a high-tech CCTV camera

Nest Labs, the home automation company bought by Google for £2 billion last year, has launched its first new product since the acquisition – a home security camera.

The Nest Cam is an updated version of the Dropcam, a product Google and Nest also bought out together last year. However, this is more than a simple rebranding. The new Nest Cam can shoot full HD 1080p, has improved night vision and has an added microphone so you can communicate through the camera. It is also now much slimmer, with flexible zinc-alloy stand so you can angle it and a magnetic base so it can be securely attached to metal surfaces.

The main selling point for the DropCam is still here though: the Nest Cam provides a constant stream of video to your phone through a companion app. You can also set Activity Zones within the camera's 130-degree field of vision, so the device will alert your phone if anyone has entered a particular area. To prevent false alarms, Nest Cam uses intelligent motion sensors that can tell the difference between a falling leaf and a person. However, while the camera can identify people, Nest drew the line at being able to recognise individuals.

"We didn't want to use facial recognition because we felt it was unnecessary and a bit intrusive. I wouldn't want to have to go up to my cleaner and ask to take her photo so I can see when she is in the room," said Billy Burnett, Nest's European communications manager.

The Nest Cam on its own costs £159/$200 on its own, but has been released alongside a new subscription service called Nest Aware. For £8/$10 or £24/$30 per month, video for the past 10 or 30 days will saved to your Nest Aware account so you

Keep an eye on everything happening in your home using the new Nest Cam

can review the day's happenings at your leisure, rather than have to just watch a live stream in real-time on your phone or computer.

Each video will include markers highlighting when the camera detected some kind of interesting movement. This means you won't have to scroll through an entire day to see if anyone had entered a room, instead clicking on a marker will allow you to jump to moments of high activity.

However, while a Nest Cam gives you the power of all-seeing surveillance, following the recent scandal involving Samsung TVs that listen to what you're saying and the furore over the Xbox One Kinect in 2013, you might have fears about who else is looking through your Nest Cam.

"We've taken security very seriously," said Billy Burnett. "The device itself is encrypted and that is something that can't be externally hacked.

> "The device will alert your phone if anyone has entered a particular area"

"Everything has 2048-bit SSL encryption, which is a very high standard. Also, every individual session is individually encrypted, so even if someone were able to hack into your account, they wouldn't have access to all the footage. Google has one of the best security records going and Dropcam is excellent too."

He also stressed that none of the manufacturers would be able to spy on you. Inviting something into your home to record is very personal so we're trying to give customers total confidence in their privacy. No one from Nest, Google or Dropcam can see any of your footage," said Burnett.

As well as launch the Nest Cam, the company also announced the second generation of its

The new Nest Protect smoke detector has many upgrades

carbon monoxide detector, the Nest Protect, and upgrades to its best-known product, the Nest Learning Thermostat.

"At Nest, we always wanted to build more than a thermostat," said Tony Fadell, Nest chief executive officer. "Our vision was to create a thoughtful home – a home that takes care of itself and the people in it. Five years later, all the pieces are in place.

"More than 9,000 developer partners are using the Works with Nest developer program to help seamlessly integrate everything from washers and dryers to cars with our thermostat, smoke alarm and camera," he added.

The new Nest Protect can detect smoke even faster with its split-spectrum sensor. While the original only had one photoelectric sensor, the new model has two, so it can tell the difference between fast and slow burning fires. It can also distinguish between smoke and steam to prevent false alarms. Should the siren go off necessarily, you can also now silence it from your phone.

The Nest Learning Thermostat will now alert you if your home's temperature should suddenly rise very high or plunge very low. The Thermostat will also now work with the Nest Protect to shut down the boiler if the smoke detector senses a leaks. The Thermostat will even be able to shut down fans, to prevent them from fuelling flames or circulating smoke through your home. ■

"A new approach to the Internet of Things"

Brillo is Google's OS to connected everyting to the web

This is how Sundar Pichai describes Project Brillo, Google's new platform for connecting everyday products to the internet. While Nest Labs is focused on the smart home, Brillo is intended to create a smart world.

"Imagine a farmer managing an entire farm from a smartphone; the security cameras, the sensors, the irrigation equipment, all of them can be connected so that they work better together," explained Pichai at Google I/O 2015.

Brillo is intended to be operating system that underpins them all. Brillo is "derived" from Android but "polished" to just the lower levels. It supports Wi-Fi and low-energy Bluetooth. Pichai also announced Weave, a cross-platform language that will help Brillo devices, the internet and phones to work together.

Android lovers with long memories will remember this not Google's first attempt to unify the Internet of Things. Android@Home was announced at Google I/O 2011, but was never heard from again. However, there is more demand for it now, as the success of Nest Labs proves.

But don't expect to buy any Brillo products any time soon. In the here and now, a Developer Preview for Project Brillo will only be available this autumn for manufacturers, with more information about Weave available in the winter.

Holographic flash cards

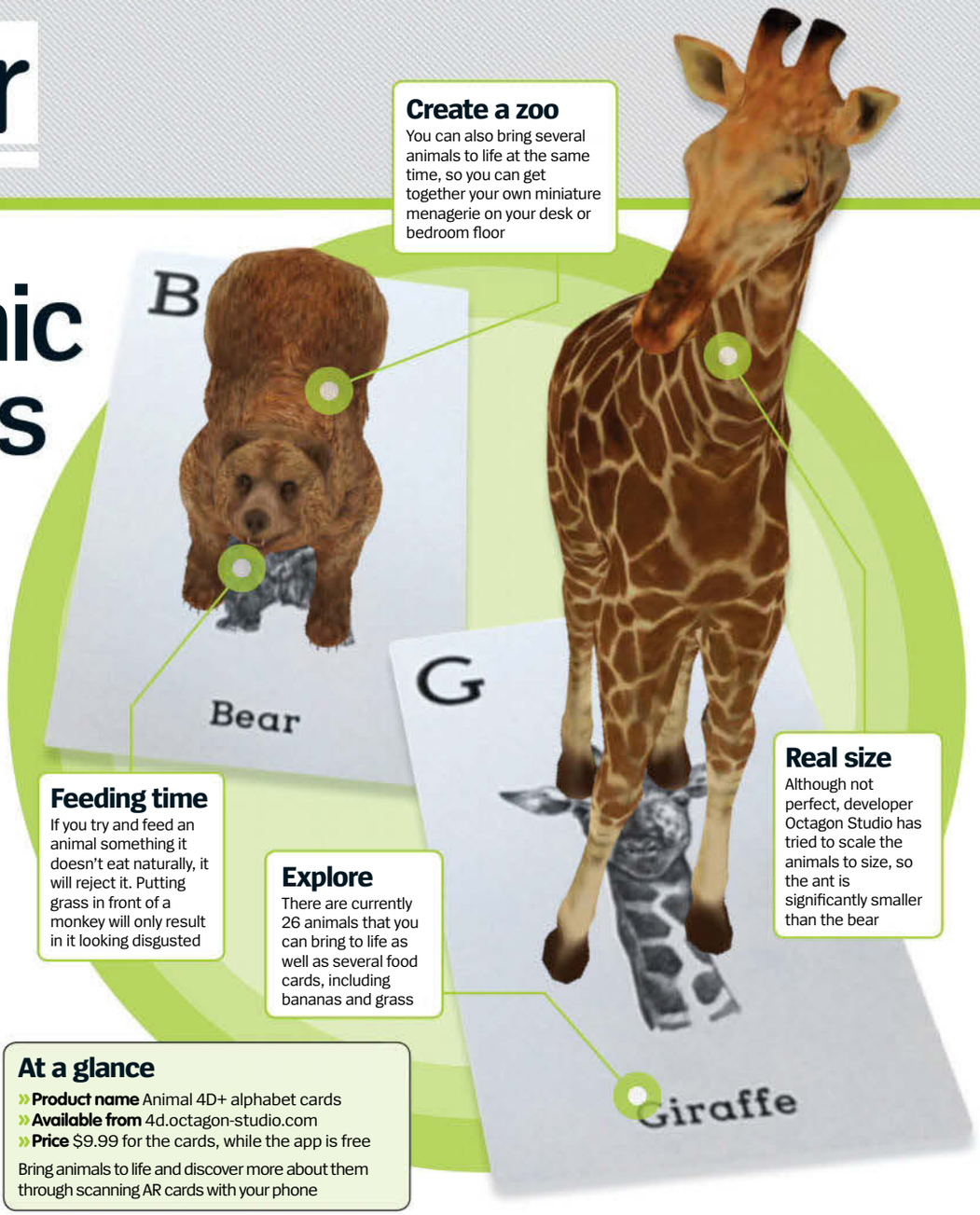
Teach kids their ABC's using augmented reality

With around-the-clock cartoons and the all-new allure of phones and tablets, trying to keep a child's attention is more difficult than ever. This is especially hard when you're trying to teach them something, like the alphabet. However, Animal 4D+ proves technology doesn't have to be your enemy.

This educational toy from Octagon Studio is a set of augmented reality flash cards that bring animals to life to teach toddlers their ABC's. Just open the free app, hold your camera over a card, and watch as animated animals instantly appear.

Featuring bears, elephants, turtles and more, as well as being useful to teach toddlers their ABC's, you can also view vital stats for each creature in the app, including scientific classification, feeding habits and where they live in the world.

As well as 26 cards for each letter of the alphabet, you can even feed the animals with companion food cards. For instance, lay the banana card next to the M for Monkey flash card and watch in awe as the simian magically walks off his card to gorge himself on fruit!



Create a zoo

You can also bring several animals to life at the same time, so you can get together your own miniature menagerie on your desk or bedroom floor

Feeding time

If you try and feed an animal something it doesn't eat naturally, it will reject it. Putting grass in front of a monkey will only result in it looking disgusted

Explore

There are currently 26 animals that you can bring to life as well as several food cards, including bananas and grass

Real size

Although not perfect, developer Octagon Studio has tried to scale the animals to size, so the ant is significantly smaller than the bear

At a glance

- **Product name** Animal 4D+ alphabet cards
- **Available from** 4d.octagon-studio.com
- **Price** $9.99 for the cards, while the app is free

Bring animals to life and discover more about them through scanning AR cards with your phone

Q&A

We spoke to **Michael Healy**, CEO of Octagon Studio about their augmented reality flash cards

How do you make the animals come to life on the card?

A The animals have been created in our studios, using highly skilled animators, artists and programmers to create remarkably realistic animals in full 3D. Using augmented reality technology and image recognition software, we can identify each card from the pack of flash cards and attach the 3D model to the card. To add additional features, we have sound and in some cases interaction between the individual cards, hence the 4D+.

What's the most difficult part of creating these cards?

A The most difficult part of bringing the animals to life was to make them ultra realistic and believable. The challenge was to find the best 3D artists, animators and programmers available to us and to create an output that was light enough to work seamlessly on mobile.

Do you see these more as a fun game or an educational tool?

A We see the animal cards as an educational tool in themselves. They educate the user as much about augmented reality (AR) and the possibilities that AR has to offer and of course it also brings the flash cards to life, which makes the learning experience more enjoyable. Education should be fun. We believe that everyone has the right to enjoy learning.

Have you got any other 4D card creations in the pipeline?

A We have projects in the pipeline. We have Dinosaurs 4D+, Space 4D+, and Octaland 4D+ all of which we are very excited about. Octaland will be launched at the Augmented Word Expo in Santa Clara in June.

Which of the animals is your favourite?

A I like the elephant and the turtle [the most]. The texture on the Elephant is fantastic and the colouring and animation of the turtle is beautiful.

The option to feed the animals and have them refuse foods they don't like is interesting. Was that always part of the original plan?

A Interactive image recognition is a very interesting feature of AR. At Octagon Studio we have been working on many different interactive scenarios. We decided to bring it into the flash cards to enhance the experience and to also educate users of the endless possibilities that AR technology has got to offer.

GALLERY OF... AMAZING MESSAGING APPS

1 Textra SMS

This good-looking SMS app is highly customisable, enabling you to change the colour scheme for every contact. Messaging is also made easy with scheduled SMS messages, a slide to call feature and quick reply pop-ups as well. Messaging made easy!

» **Price:** Free + IAPs

2 Hello SMS

This app uses tabs to make it simple to switch between conversations. This is quick and easy and eliminates the unnecessary clutter that something such as having an inbox can bring. SMS messages are free when you text other Hello users.

» **Price:** Free + IAPs

3 Facebook Messenger

Chances are if you are on Facebook, then you already use this app. It's unique chat heads feature enables you to text while using other apps and you can make free calls to anyone in the world, which is a very useful feature.

» **Price:** Free

4 LINE

Blurring the line between messaging and social networking even further, 'LINE: free calls and messages' offers free messaging as well video and voice calls. You also have the option to share daily status updates and images too.

» **Price:** Free + IAPs

5 Telegram

If you're concerned about privacy, you'll be pleased to know Telegram is heavily encrypted, but still provides the level of service we've come to expect. Chat with up to 200 friends, share files and sync messages across devices.

» **Price:** Free

6 Go SMS Pro

While not quite as pretty as some of the other apps featured here, GO SMS Pro is packed with features. Hide private messages from prying eyes, schedule messages for a specific time and blacklist nuisance numbers to keep your messages safe.

» **Price:** Free + IAPs

10 reasons how... Google will change the world

They're building a fleet of internet balloons

Two thirds of the world doesn't have internet access. Project Loon is designed to connect remote places using a fleet of helium balloons that circle Earth broadcasting LTE bandwidth. Not just a 'pie in the sky' concept, working balloons have been tested in New Zealand and Brazil, lasting over a 100 days in the air, providing 10 Mbps connectivity with 500metre accuracy. However, this project is still considered a pilot with no formal date announced for worldwide roll out.

Minority Report gesture controls are coming soon

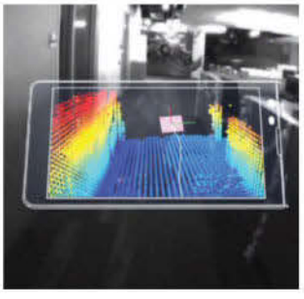
A recent announcement revealed that Google has developed a radar emitter the size of a microSD card that can detect your hand movements. Codenamed Project Soli, the microchip is designed to be used in wearables and will recognise and respond to hand gestures, such as cranking an imaginary volume dial up or down, or pressing a button. Without the need for physical controls, smartwatches and smart home devices can be sleeker and more stylish.

Improving city living

Google are funding an institute called Side Walk Labs, which aims to improve urban life. Working in New York, this will include tackling issues such as making transport more efficient, lowering the cost of living and reducing energy usage. The institute is led by Dan Doctoroff, who worked post-9/11 as Deputy Mayor of Economic Development and Rebuilding for the City of New York before becoming CEO of Bloomberg financial services.

3D mapping devices will help the blind to 'see'

Available to buy now, Project Tango's Development Kit includes a smartphone and tablet equipped with cameras and sensors to understand space and motion. These gadgets can then build 3D maps that have a variety of world-changing uses. First and foremost, they could be used in wearables that help the visually impaired 'see' in front of them and warn them about obstacles in their paths. The 3D maps can also be used to steer robots and develop augmented reality apps.



Transforming the US wireless industry

Not content to be the world's most popular phone software provider, Google wants to be the most affordable mobile network provider in the US as well. Basic phone service will cost $20 a month, but customers will get money back depending on how much data they use. Leasing cellular tower usage from established networks Sprint and T-Mobile, Project Fi also promises that subscribers will connect to the fastest network available. Currently the service is only available to Nexus 6 owners, but rollout will begin this summer.

Self-assembly smartphones

Rather than buying a new phone every year, imagine upgrading the one you already have with a faster processor and bigger memory, or customising your phone with a longer-lasting battery and better camera when going on holiday. This might sound like science fiction, but Google have already shown off working models of this so-called 'modular phone' that they codename Project Ara. Google are also set to begin their first real-world trial later this year, selling Project Ara phones exclusively in Puerto Rico.

Data-scrambling SD cards

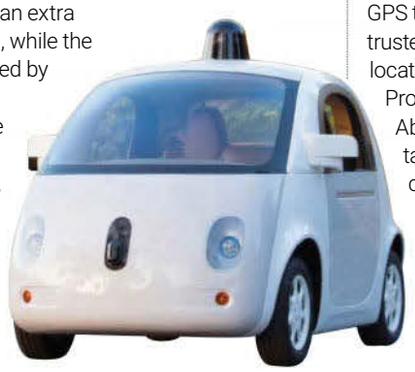
While every new Nexus launch confirms the Mountain View's preference for cloud computing, Google hasn't forgotten about expandable storage. Just as Project Abacus is trying to revolutionise how we verify our identity, another project – codenamed Vault – aims to protect our privacy via the microSD slot. They've developed a new microSD smart card that scrambles any sensitive information stored on the device. With a built-in microprocessor and NFC chip, the card can also communicate with other devices.

Touch-sensitive denim

Soon you will be able to dial a call on your phone with just a stroke of your sleeve. Project Jacquard has woven touchscreen controls into fabric using conductive threads, so that it can interact with your phone and other devices. Google have worked with Levi Strauss and other partners to create so-called 'Jacquard yarn' that can be created on an industrial scale and stitched together by a tailor with only a basic understanding of how the tech works.

Road safe self-driving cars

Google's autonomous cars have driven 1.7 million miles in the last six years. They have only been involved in 11 accidents, but 'not once was the self-driving car the cause of the accident,' said Chris Urmson, director of the project. Some occurred while humans were driving (humans drove the cars an extra 700,000 miles), while the rest were caused by other drivers rear-ending the Google-mobiles. Sadly, there is no sign of the self-driving cars going on sale any time soon.



Killing off passwords

A major feature of Android Lollipop was smart locking, which tried to replace your lockscreen PIN code with facial recognition and using GPS to set up trusted locations. Project Abacus takes this concept a step further, learning to recognise the unique way a user holds their phone or taps on a keyboard to verify their identity. Based on trials using 40TB of data at 33 different US universities, Google says this technology is ten times more secure than using a fingerprint scanner.

The future of Android is here. Officially announced at the Google I/O conference in May, the next big OS update is called Android M and includes a new way to shop using your phone, a smarter Google Now and a longer battery life. However, despite these innovative additions, the main aim of the new OS is to refine what your device can already do after Android Lollipop's radical shake up last year. Google says it has squashed thousands of bugs that were in Android 5.0 and 5.1 as well as restore popular features that were lost in Lollipop. Easy-to-use volume controls, the choice of light and dark themes, and greater support for external memory are just three things Android fans have been clamouring for that are now part of M.

The full consumer version won't arrive until this autumn, coming on flagship phones like the Nexus 6, Samsung Galaxy S6, LG G4 and HTC One M9. But in this guide we will show you how to get early access to the best Android M features and install them on your current phone. Most of this will be using the Android M Developer Preview which is a beta version designed for app developers to test out their products on this. The Preview is available to install on Nexus 5's, 6's and 9's and, for the first time ever, select Sony Xperia handsets that are part of Sony's Open Devices program. Read on to find out how to set up the Developer Preview on Nexus, but bear in mind this will require rooting your device which can be dangerous for those that don't know what they're doing. If you don't have a Nexus or Sony Xperia phone, we'll also give you top apps and other hacks to try out Android M features today.

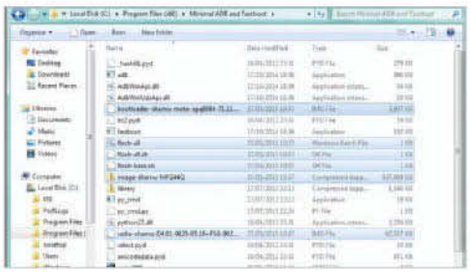
Set up the Android M Developer Preview

Try out next-gen features on your Nexus today

The finished version of Android M will roll out this autumn, complete with a much more delicious name. Just like Android L became Android Lollipop, Android M is expected to be named after a sweet or dessert, with many developers on forums nicknaming Android Muffin. Also just like Android L, early adopters can test out features before the official release using the Developer Preview. However, just like a muffin that's taken out of the oven too soon, the Preview isn't quite done. Only intended for industry use, not every Android M feature works. However, if you can wait to try sample it for yourself, read on to find out how to install the SDK. This requires rooting your device which can damage it if you're don't know what you're doing.

1 Install desktop software

Install the XDA developer tools Minimal ADB and Fastboot onto your Windows PC. Next, head to **goo.gl/ynHnwL** and download the Android M installer for your device. Each installer is specific to the Nexus 5, 6, 9 or Player so ensure you've downloaded the right file for your handset.



2 Zip extraction

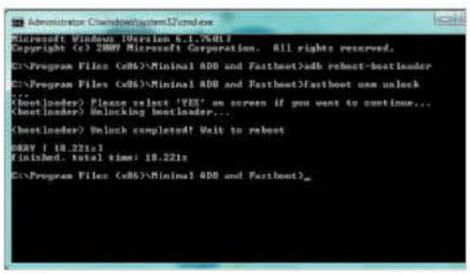
Use a file archiver such as 7-Zip to extract the files from the downloaded folder. Next, you need to move those extracted files across to wherever you've saved the Minimal ADB and Fastboot file. All files should be TAR files, so rename them if needed.

3 Enable Developer mode

In your phone's settings, scroll down to About phone. Tap Build number seven times to enable Developer mode. Go back one screen and open Developer options. Enable OEM unlocking and USB debugging. Connect your phone to your PC and download the Google USB Driver.

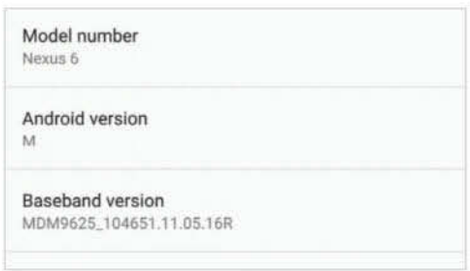
4 Allow USB debugging

Extract everything from the ZIP file, click on Start>Devices>Printers, then click on your phone's file and select Properties. Click on Hardware>Device Functions>Properties. Enable USB debugging and then click OK. You'll need to update the Google USB Driver to finish.



5 Flash Android M

Back up your device and launch Minimal ADB and Fastboot. Type **adb reboot-bootloader** and press Enter – your device should enter Fastboot. See if it is in LOCK STATE or not. If it is, type **fastbook oem unlock** and Enter. Select Yes with the volume button and Power to confirm.



6 Get Android M

The rest of the procedure should be fairly straightforward. Type **flash-all** and then Enter. Reboot your phone and you should see Android M appear as your OS. Check this by going to Settings, then About phone and finally checking the Android version.

Get it now

XPERIA Sony Smartphone

Sony Open Devices Program

For the first time ever, Sony Xperia owners will be able to install the Android M Developer Preview. For more information, visit **http://goo.gl/zTgglm**

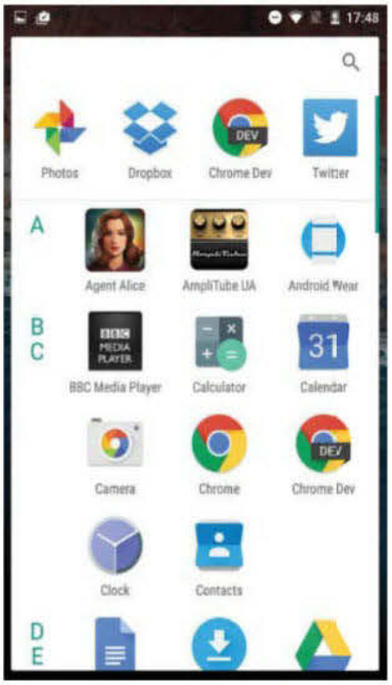
"Only intended for industry use, not every Android M feature works"

New polished design

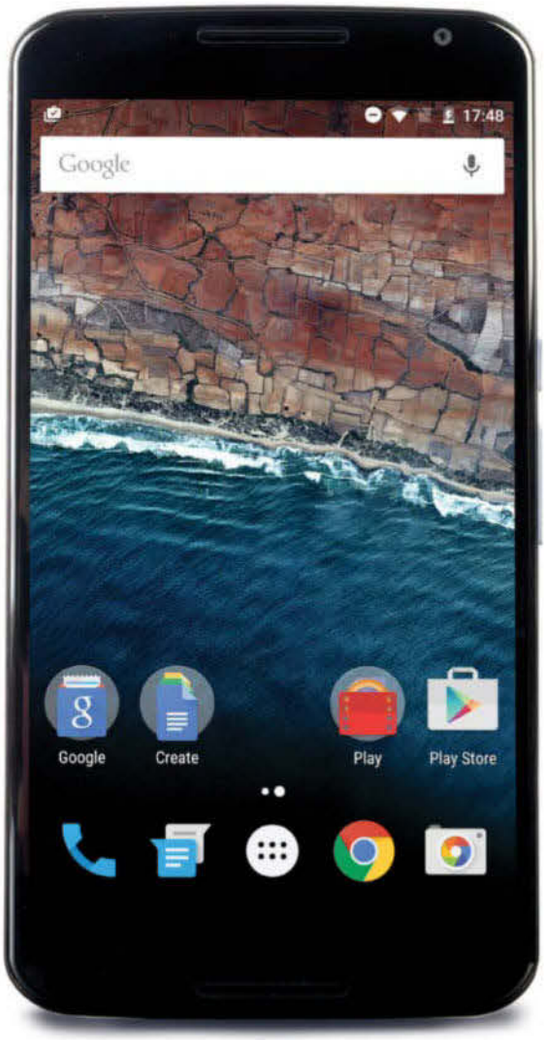
Material Design has been fine-tuned with new features

After last year's major redesign, Android M's new look is much more subtle. For instance, the origami-like app icons and colourful backgrounds of Lollipop's Material Design are still here, but you can now choose between light and dark themes for the settings menus. Perhaps the biggest change to the user interface is that the app draw has been completely changed. Android has used a horizontally scrolling app drawer since Ice Cream Sandwich, but has now ditched that in favour of one that scrolls vertically with your four most recently used apps appearing it the top of the draw for added convenience. Another change that will make Android easier to use is that you can now uninstall apps from the homescreen, rather than just deleting them from sight.

Android M also reintroduced many features that Lollipop removed, such as Do Not Disturb mode. No design update, however, could be complete without new wallpapers. Android M will boast 11 new backgrounds, but sadly only one of these made it into the Developer Preview. As you can see on the right, this wallpaper is an aerial shot of a rugged coastline, not dissimilar to many of the backgrounds included in Lollipop.



Your new app draw will now scroll up and down



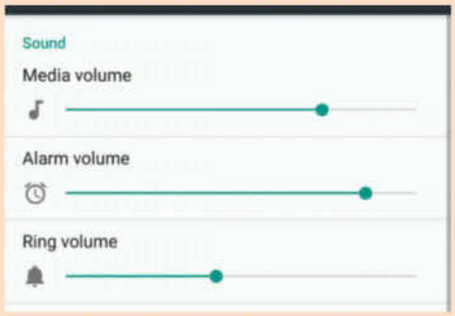
Get it now

Layers Manager » **Price** Free » **Requires Android** 5.0

If you want to get the look of Android M without all the features, this app will help you theme your phone using RRO themes.

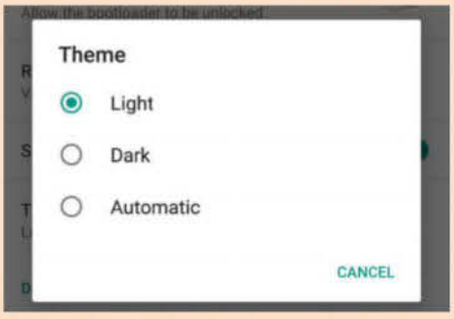
Adjust volume

Do Not Disturb was removed from Lollipop – something that proved to be an unpopular decision with users and so it returns in Android M. Push and hold the volume-down button until it turns to Vibrate mode. Release and push again to activate Do Not Disturb. The arrow also opens up the audio and alarm settings.



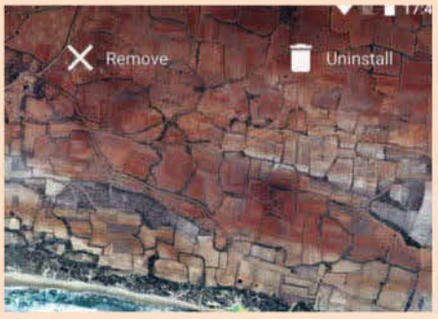
Go back to black

To get rid of the bright white backgrounds of Android Lollipop, you can now set a dark theme in Android M. In the Developer Preview, first enable developer options in Settings> About. Tap on Theme and change to Dark or Automatic, where the phone will adjust the theme based on the lighting conditions.



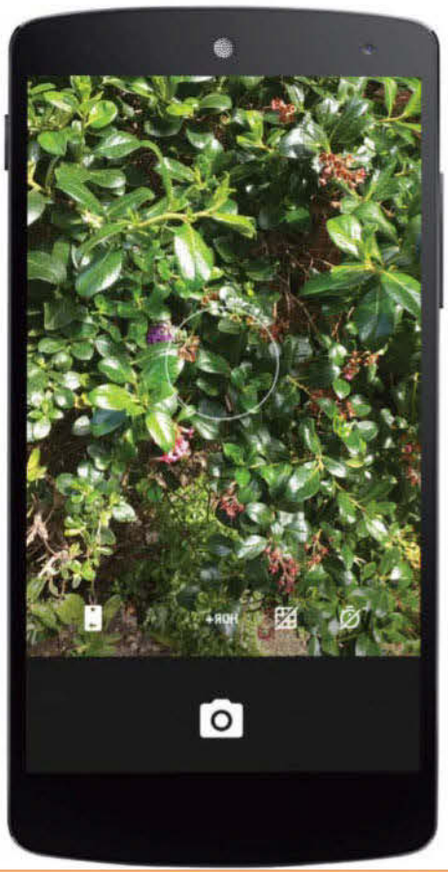
Delete apps from the homescreen

You can uninstall apps from your homescreen in Android M. Press and hold the app you want to remove and you'll get two options – Remove and Uninstall. Remove will delete the widget, but Uninstall will delete the app permanently.



Take faster photos

Capture HDR photos without the delay



The likes of Sony, Samsung, HTC and LG pride themselves on the quality of their cameras, competing for the highest amount of megapixels, the biggest apertures and the brightest flash. However, the stock camera app has a big part to play here and Google has updated it for Android M. In the new update's camera, the first thing you notice is that the time between pressing the button and the photo being snapped is lightning fast. HDR mode, which traditionally takes a little while longer, has also been sped up, making blurry images less likely. The animation that plays while you are focusing the camera has also altered, the circle now expands and contracts rather than rotating. The speed is the main draw though, and it will hopefully make capturing that special moment much easier to do.

Get it now

Google Camera

» **Price** Free
» **Requires Android** 4.4

You can try taking faster HDR photos on your current-gen phone right now, just update Google Camera to version 2.5.

Get multi-window views

Multi-window has been a feature of Samsung phones for four years, but is now coming to stock Android. It enables a user to view more than one window on screen at the same time. You can get up to four images on a screen at once as the multi-window setting is customisable, enabling you to display your windows in different ways. As it is still an experimental feature that's buggy and prone to crashing, this is only available to those who want to go looking for it, but it will enhance your user experience on large-screened handsets. We are expecting this to be rolled out to all in the autumn or during the first M update, but if you want to get it straight away then you will have to alter your 'build.prop' file and jump through multiple other hoops to get it. However, if you are prepared to do so, it is a very useful and fun new feature.

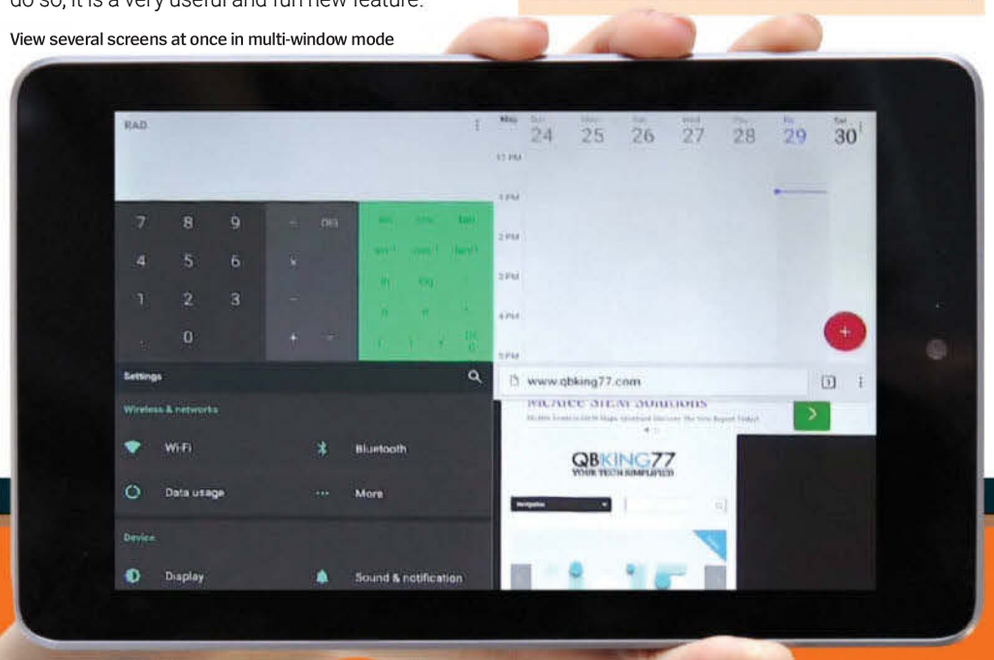
Get it now

XMultiWindow

» **Price** Free
» **Requires Android** 5.0

If you're still yet to get Android M on your Nexus 5, download this Xposed module to add the useful multi-window mode.

View several screens at once in multi-window mode



Chrome everywhere

Android M is also making navigation around various apps a lot quicker and easier. Developers will now be able to include a line of code inside their app that takes a user directly to the best app to open a particular link. So, for example, if you click on a YouTube link in your Twitter app it will take you directly to YouTube, rather than asking if you'd like to open it in Chrome. This will make things quicker for users and means each link is opened in the best possible place.

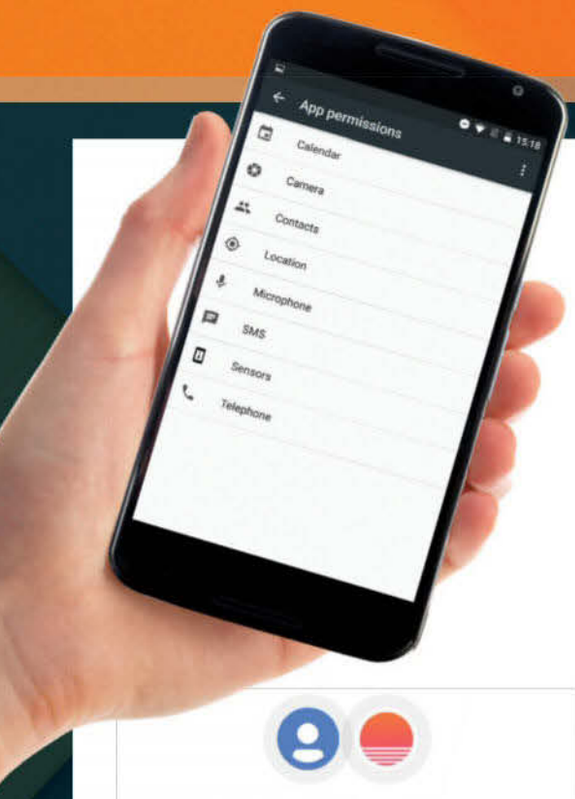
Android M also brings Chrome Custom Tabs to users. Instead of opening a link in Chrome or having to develop web hosting within the app, Chrome will now open over the top of the app, marrying up the look and feel of the app with the security features, speed and saved passwords of Chrome. These two developments will greatly improve the user experience and make using apps a much more pleasant experience, without the user having to do a single thing.

Get it now

ActivityForce New Task

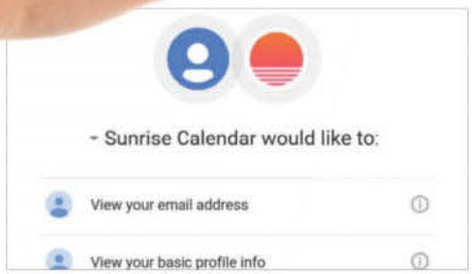
» **Price** Free
» **Requires** Xposed Framework

Force your phone to start a new application when clicking a link with this Xposed module. This should take you to the best option for the job.



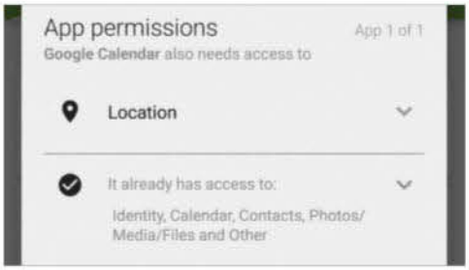
Protect your privacy with app permissions

At the moment, you have to accept lots of permissions every time you download an app, enabling access to everything from your contacts to your microphone. However, Android M heralds a move away from that, as apps will now only be able to access certain areas of your phone when it is necessary. When you download an app in Android M, it will download without asking you to accept permissions, but as soon as you use a part of an app that requires access to a section of your phone, such as access to your microphone when you want to use speech-to-text in Whatsapp, a permissions request will pop up. You can also go back and remove previously granted permissions if you no longer want an app to have access. This tutorial will show you what app downloading looks like in M as well as how to remove certain permissions from apps.



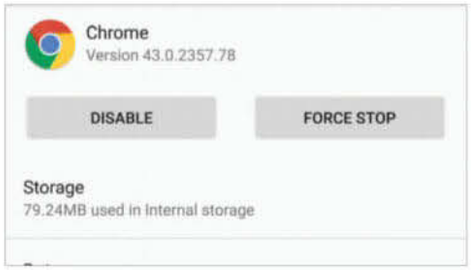
1 Download your app

When you download an app it will now only ask for the permissions required for it to begin running. For example, a calendar app would have to know your contacts and existing calendar to be useful. Click Accept for these permissions if you are happy with them.



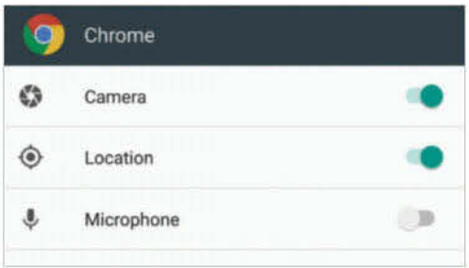
2 Enable more permissions

When the app needs further access it will bring up a dialog box telling you specifically what permission it requires. If you tap the arrow on the right it will give you more information. Tap accept if you're happy, but if not, tap Skip. Doing this might impair the app's performance, however.



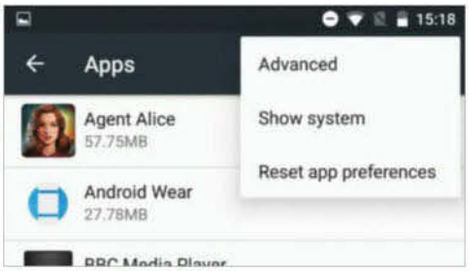
3 Use advanced settings

Pull down the Quick Settings menu and select the cog icon. Scroll down till you reach Apps and tap on that. This will bring up your entire apps list. Tap on any app and it will bring up that app's info page. Hit Permissions to see what you've enabled the app to access.



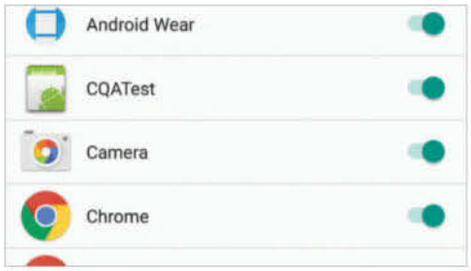
4 Monitor permissions

You will now see all the areas an app can see or hear. To remove access for an area, for example, the microphone, tap on the slider. This will remove the permission for access. Don't forget that this could potentially impair the app's ability to function.



5 Advanced settings

Head back into the main apps list and tap the triple-dot menu in the top right-hand corner. This will bring up a small drop-down menu. Tap on Advanced and that will take you into the main app information menu. Hit App permissions to see a list of all permissions.



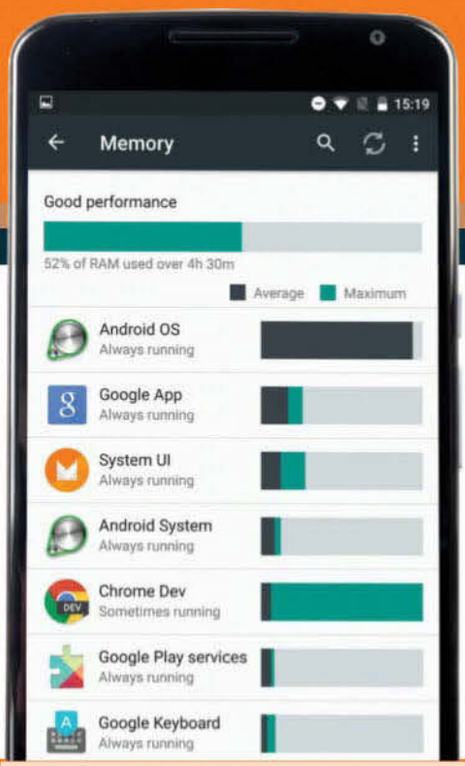
6 Alter mass permissions

Tap on an area of your phone to see all the apps that have access to a particular section. From here you can tap the sliders to stop apps accessing that area. This is a quicker way of stopping apps seeing parts of your device than going through each app individually.

Get it now

XPrivacy » **Price** Free » **Requires Android** 4.0.3
Choose which permissions you grant an app with XPrivacy. This Xposed module can restrict access to any part of your phone or tablet.

"Apps will now only be able to access certain areas of your phone"



Check memory usage

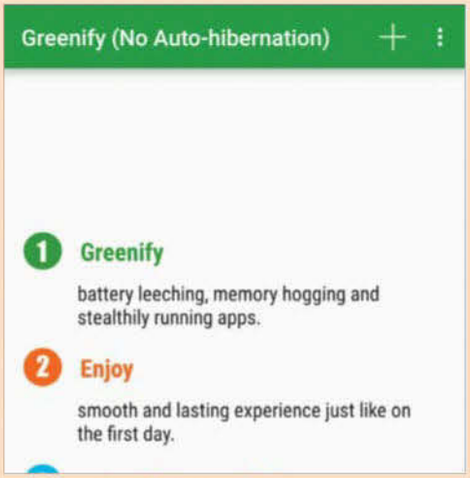
Google has made checking and managing your RAM usage much easier with Android M. While previous iterations of Android has shown the amount of memory and storage an app uses, M digs deeper into the data to tell you how much RAM it uses on average and the maximum amount it has used in a specific time-frame.

You can find this data by hitting the Apps menu in Settings, then Advanced from the triple-dot menu and Memory. From this screen you can see how efficient your apps are and identify the RAM-hungry ones that you may need to reconsider using. The time-frame it takes this data from can be altered by hitting the triple-dot menu in the top right of the Memory menu, tapping Duration and then selecting your chosen time-frame.

Get it now

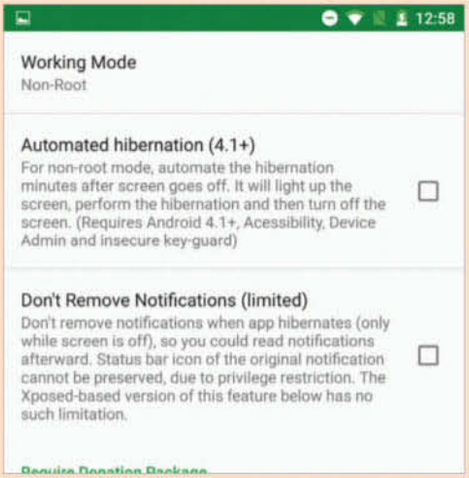
Greenify
»**Price** Free
»**Requires Android** varies

Until Android M arrives, keep those RAM-hungry apps in check by using Greenify, which hibernates specified apps when not in use.



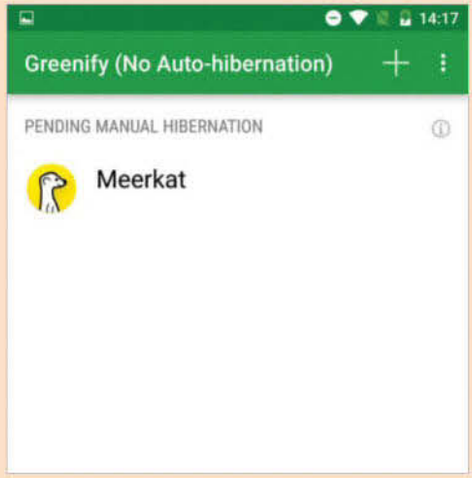
1 Activate Greenify

Download the app and then go into the Settings on your device. Tap Accessibility and you should see Greenify in the Services list. Tap it and then tap On.



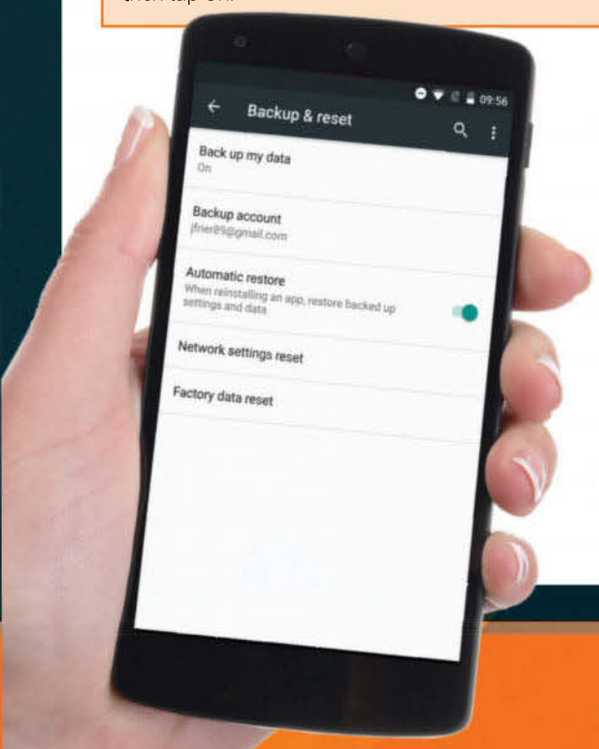
2 Make a shortcut

Open Greenify and tap the triple-dot menu. Select 'Create hibernation shortcut' and choose either of the two options. This puts a Greenify widget on your homescreen.



3 Hibernate your apps

To hibernate any apps that are running unnecessarily, all you have to do is press the floating green circle that is located in the lower right-hand corner. It is that simple!

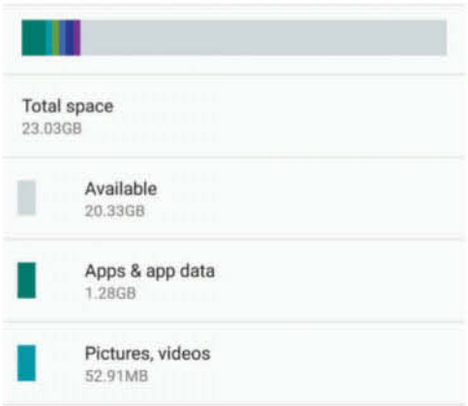


Auto-back up apps

Your phone will now automatically back up your apps in case you delete an app or change your handset. Apps data up to 25MB per app will be saved to your Google Drive, although it seems that it won't count towards your overall drive limit, so that any data you might lose in a transition or accidental deletion can be restored instantly once you've re-installed the deleted app. Auto back up happens every 24 hours, so there is a chance that you could lose a bit of data from the last day, but overall it should prove extremely beneficial and won't require you to do a thing. Data back up has existed in Android before but this looks like being the first automatic system that works and doesn't eat up your cloud or SD card storage space.

Get it now

Helium »**Price** Free »**Requires Android** 4.0
One of the Google Play store's best back up apps, Helium makes moving your data to SD card or cloud storage easy.



Save apps to your microSD

If you use a microSD card, your device is suddenly going to get a lot more free storage in Android M. One of the many new features that Google didn't really advertise about Android M at its launch event was Adoptable Storage Devices. Adoptable basically means that Android M can "adopt" an external storage device like a microSD card, and format and encrypt it so it acts like the device's internal storage. It looks like Google no longer sees microSD as for storing media only – with adoptable storage, you will be able to move apps and their data to microSD or other external storage devices. The caveat is that you won't be able to use an adopted card on other devices because of the encryption, but that's a small sacrifice given the benefits.

This move seem like a strange one, given that Google's own Nexus devices don't have microSD cards and Samsung recently dropped their external storage port on the Galaxy S6, but it looks like Google is willing to experiment. Currently Adoptable Storage Devices even supports USB OTG drives, so you could theoretically use a USB stick or external hard drive with your Android device.

Get it now

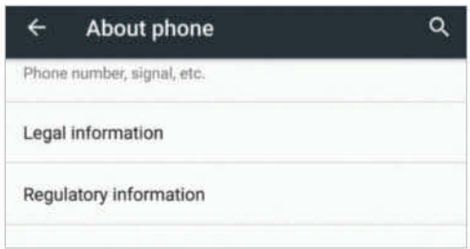
Handle ExternalStorage

» **Price** Free
» **Requires Android** 4.0.3

Until Android M, even devices with SD card slots couldn't access them. This module gives read/write access to those phones.

Customise your Quick Settings

Active hidden modes to organise your Quick Settings easily

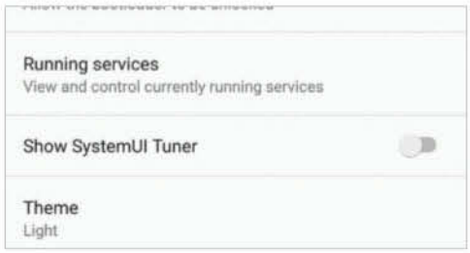


1 Activate Developer mode

Scroll down your settings until you reach About phone. Tap it, then hit Build number seven times to activate Developer mode and unlock certain extra features of your phone.

2 Open Developer options

Go back one step and you should now see a Developer options menu appear. Tap on that and it will bring up a new menu full of new functions that are unavailable to casual users.



3 Show SystemUI Tuner

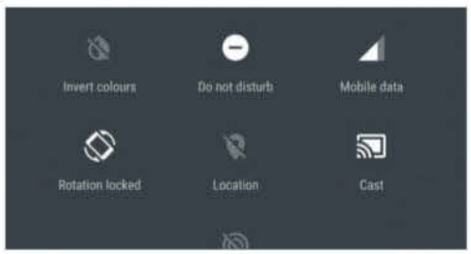
Scroll down Developer options until you see 'Show SystemUI Tuner'. Set the slider to 'on'. If it isn't activated, slide the very top On/Off slider to 'on' as well.

4 Open System UI tuner

Go back one step to the Settings menu and at the bottom you should see the 'System UI tuner' option. Tap on this and then simply hit the Quick Settings option.

5 Organise Quick Settings

This will bring up your Quick Settings. Now you can rearrange it to make it look how you want. Press and hold an icon to select it then place it where you wish.



6 Add and delete icons

Press on any icon in the Quick Settings and drag it down to the Delete bin. You can also add supported icons and reset using the top-right triple-dot menu.

Get it now

GravityBox [LP]

» **Price** Free » **Requires Android** 5.0

This only works on vanilla Android but enables you to customise your Lollipop Quick Settings amongst other changes.

Double your battery life

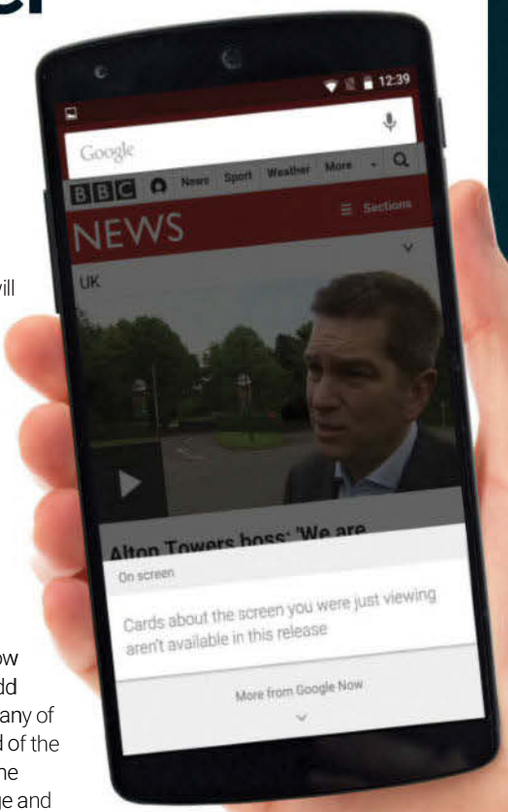
A headline feature of Android M is Doze mode, where your phone or tablet is put into a deep sleep, prolonging your battery life while your handset is on standby. The device knows when it's not being used and shuts down all functions, only waking up when it registers that it's in use or a high priority notification comes through. Tests have shown that Doze can double the battery life of a Nexus 5 which could save you from having to recharge your phone or tablet on a daily basis. Alongside Doze is battery optimisation and App standby. The former enables certain apps, like the Google Play store, to be unaffected by battery saver mode so updates can occur easily. You can add apps to that list, but be aware that this will negate a lot of the battery-saving work already done. App standby is a feature like Doze, but works with individual apps. In Android M you can set certain apps to go to sleep when they haven't been used in a while, saving battery power and RAM. Find this in the Advanced App menu of your settings.

Get it now

Deep Sleep » **Price** Free » **Requires Android** 2.3
This app sends your mobile into a deep sleep and you can customise its duration and apps affected.

Google Now gets smarter

Google Now is about to be revolutioned by a new feature called 'Now on Tap'. At the moment, Google Now only offers basic information like local weather and the next fixture of your favourite sports teams, based on key search terms. However, Now on Tap will be able to offer smarter searching based on context. Soon you'll be able to ask "Who is this?" when listening to a song on your phone and Google Now will understand because you're using Spotify, for example, that you're asking a question about the artist that is playing. It's not just about Google searches either. If you mention a place such as a restaurant in a text or email, Now on Tap will ask if you want to add in a reminder for that event. All any of this will take is a press and hold of the home button, which prompts the system to scan the current page and highlight key words to understand the context around your search. Sadly, Google are keeping this feature firmly under wraps and Now on Tap has not be included in the Developer Preview. Instead, pressing and holding the home button will only be greeted with a blank card.



Pay with Android

Android Pay wants to become the new way to shop. This is to be made possible by the standardisation of finger printing technology in Android M. You set up a credit or debit card on the phone and swipe it on the card reader. The secure chip creates a one-time payment token so the card reader doesn't have access to your card details, removing a security risk. Google expects the technology to advance so rapidly that card terminals could soon have fingerprint scanners. So we may not be far from NFC technology picking up the phone in your pocket, making the connection and authorising the payment through your fingerprint on the terminal, all without touching your phone.

Android Pay is set to be supported by MasterCard, Visa, American Express and Discover, work at over 700,000 retailers and work for in-app purchases. With Android making mobile payments easy to set up, easy to use and safe, Android M could finally see a popular Android-based payment system.

Get it now

SAMSUNG

Samsung Pay » **Price** Free » **Requires** Samsung Galaxy S6
Samsung Galaxy S6 owners will soon be able to pay for goods at nearly every merchant location in the world using NFC and magstripe technology.

Cardboard 2.0

Discover how Google is unfolding the future of virtual reality and making it accessible to everyone

What a difference a year makes in the world of technology. Last year Google gave away its Cardboard virtual reality headset as a free gift to developers at the end of the Google I/O conference. This year, the product was firmly placed in centre stage during the conference keynote. One million Cardboard viewers have been shipped worldwide and over 500 compatible apps are available on the Play store. But Google is not going to stop there. With a new-look Cardboard viewer and an ambitious vision to make sharing virtual reality experiences accessible to everyone, the tech giant is pushing the envelope of virtual reality.

VR for everyone

If you're not familiar with Cardboard, it's similar to the Samsung Gear VR that was also launched last year. If that still doesn't mean anything to you, it's a headset where you insert your smartphone in the front to act as both the display and the computing power for your virtual reality experience. Stereoscopic lenses in the headset then convert compatible apps and games running on your phone into immersive 3D worlds.

The big difference between Samsung's Gear VR and Google's Cardboard headset though is price. The Gear VR costs £200 and is only compatible with Samsung's top-of-the-line phones, the Galaxy Note 4 and Galaxy S6. Cardboard, on the other hand, costs as little as £20 and works with any Android phone. So why is it so cheap? Well, as you may have guessed from its name, Google's headset is made of cardboard.

"Our goal with Cardboard was to make virtual reality available to everyone," said Clay Bavor, Google's vice president of product management, speaking at this year's Google I/O conference on 28 May. "So we started with a piece of cardboard, some velcro, added some lenses and a rubber band. And amazingly enough, that was all you needed to turn your smartphone into a fully functional VR viewer."

How to use your headset

1 Construction

The Cardboard viewer arrives as a flatpack. While the original took 12 steps to assemble, it now only takes three. Remove the sleeve, unfold the flaps and your done.

2 Launch the app

Download the free Cardboard companion app from the Play store or – for the first time – you can download it onto your iPhone from the App Store.

3 Pair devices

Officially licensed viewers will include a QR code for you to scan with your camera to sync your headset's parameters with the Cardboard app. If your headset doesn't have this, just press skip.

4 Insert your phone

Once pairing is completed, insert your phone and close the lid on the back of the headset. Make sure the velcro is firmly stuck together, so your device doesn't fall out!

5 Explore

The official app includes demos to sample what the viewer can do, but download other Cardboard-compatible apps from the Play store to really make the most of it.

Bavor then went on to announce an updated version of the original Cardboard. However, rather than upgrading it with complicated new features, the update made it even more simplistic: the flatpack you assemble the Cardboard viewer from now only takes three steps instead of 12. Google has also got rid of the magnetic button that only worked with phones with built-in NFC and replaced it with a conductive one that will work with all devices.

If Cardboard sounds like it is disconcertingly low-tech, that's because it is. Android smartphones already have the processing power and display quality to match virtual reality's gold standard – the Oculus Rift. Oculus grabbed headlines as a Kickstarter project that was bought out by Facebook for $2 billion last year. A finished headset isn't expected to appear until next year, but developer kits are already publicly available and sell for $350 (£225). However, a teardown video by the California-based repair firm iFixit, revealed that the screen from the Oculus Rift Developer Kit 2 is taken straight from the Samsung Galaxy Note 3. It is perhaps no surprise then, that the Samsung Gear VR is also built using Oculus tech and runs Oculus apps. It's also the reason other phone manufacturers are trying to break into the world of virtual reality. Sony is set to combine the displays from its Xperia smartphones and gaming expertise from the PlayStation 3 with the Project Morpheus headset, while HTC is working with games publisher Valve on the HTC Vive.

However, there is one major mobile manufacturer that's yet to enter the Matrix: iOS. Looking to rectify this, Google has made the new Cardboard viewer larger, not only so that it works with 6-inch Android phablets, but the iPhone 6 as well. The Cardboard app is also now free to download on the iOS App Store. As Bavor put it, "So it works with any phone. It fits any phone. The button works with every phone. But the software, the Cardboard SDK, it needs to work with every phone, too."

An open-source ecosystem

If you're still not comfortable with the idea of a paper headset, you'll be glad to know that Google's Cardboard viewer is like the Nexus of Android phones; it represents Google's vision of how the product should be, but is far from the only Cardboard VR headset out there. As soon as Cardboard was announced, Google made the »

The new Cardboard viewer is now large enough to support 6-inch phones – including the iPhone 6

specifications for the headset totally open source. You can even download the Cardboard template for yourself and make your own, just visit **google.com/cardboard**.

This has led to an explosion of creative headsets that work with Cardboard's software, but are made from different materials. For example, the Knox Aluminium is made, you guessed it, from aluminium but also wood, so it resembles the Morris Minor of VR. A company named I Am Cardboard mostly make near stock variations of the Cardboard headset, but in a range a different colours. However, it has also developed the premium XG VR, which is made of plastic and includes a foam lining for a more comfortable fit. It even comes with a Bluetooth controller, but it does retail for $279 (£179). Mattel is also getting in on the act, relaunching its classic kids toy, the View-Master, to work with Cardboard VR this autumn.

The three biggest manufacturers of Cardboard viewers are Knox Labs, I Am Cardboard and DODOcase. DODOcase is particularly interesting because up until the launch of the Cardboard, it only produced iPhone and iPad cases. However, Craig Dalton, co-founder of DODOcase doesn't think it was that much of a sea-change for the company.

"DODOcase is a tablet and phone accessory manufacturer. Smartphone VR viewers are essentially a phone accessory. We specialise in understanding how people use devices and creating products that complement that use."

Dalton also believes that Cardboard has a distinct advantage over the Oculus Rift. "Smartphone VR [Cardboard] is the gateway to the entire VR industry. Without it, the industry will remain pigeon holed in the gaming community for years and will fail to realise its full potential. The price, portability and social sharing aspects of smartphone VR make it the perfect entree to VR," he concludes.

However, Cardboard has had its growing pains. With so much variation on the original design, some viewers have had slightly different optics and dimensions, so they won't work as well »

> "As soon as Cardboard was announced, Google made the specifications totally open source"

Enter the Matrix...

From exploring space to getting a front-row seat to a live show, here are the first apps to try on Cardboard

Titans of Space

Free

Explore the solar system with the Titans of Space app by DrashVR. The celestial bodies are all reproduced to scale at one millionth of their actual size, so you can explore them in your living room. Each planet includes a fact file, and a guided tour is available through an in-app purchase. While the graphics are not as impressive as those shown off in the new Expedition promos, Titans of Space will give you a feel of what to expect from the all-new VR experience.

Jack White: THIRD-D

Free

Enjoy an up-close performance with White Stripes frontman, Jack White, with this free download. From the perspective of being on stage with the rock star, you can watch him perform three tracks: 'Freedom At 21' and 'Ball and Biscuit' at The Bleacher Theater at Fenway Park in Boston, and 'Dead Leaves and the Dirty Ground' at Red Rocks Amphitheatre in Colorado. To ensure the sound is as immersive as the video, this app is also mixed using cinema-quality Dolby Atmos.

Go on a VR field trip with Expeditions

Low-cost, easy to use and with the power to transport you anywhere, Google believes Cardboard can be used in schools. The tech giant has launched a new kit called Expeditions, which will take classrooms on virtual tours of places they wouldn't otherwise be able to visit.

"There's something amazing about visiting a place, seeing it up close, and experiencing it with your own eyes. But, of course, the school bus, it can't go everywhere," explains Clay Bavor, Google's vice president of product management.

"It can't go to the moon, it can't go to another country and back in a day, it can't go to the bottom of the Pacific Ocean. But VR can help take you to all of those places."

Schools will be able to buy Expeditions kits, which contain Cardboard viewers and the phones needed to make them work for up to 30 students, plus a control tablet for the teacher. All of the headsets will be synchronised, so when the teacher chooses from a selection of ready-made virtual field trips, the whole class will jump there together. For instance, a promotional video showed students exploring the wonders of the Great Wall of China together.

Google has already tested Expeditions in hundreds of classes around the world and is working with museums to develop new VR experiences. Google says it has partnered with organisations including The Planetary Society, the Chateau de Versailles, the Smithsonian and the American Museum of Natural History. Teachers can sign up for the new program now.

Orbulus

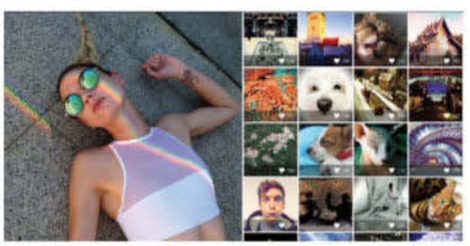
Free

If you were a fan of Android 4.2 Jellybean's PhotoSphere camera mode, try Orbulus. PhotoSphere let you shoot 360-degree panoramas and upload them to Google Maps and Google+. Orbulus lets you view PhotoSpheres from around the world through your Cardboard headset, including incredible landscapes and venues. A particularly cool feature is that you start off in outer space, and select a planet-like PhotoSphere by simply holding your gaze on it.

Roller Coaster VR

Free

Roller Coaster VR offers all the fun of a theme park ride from the comfort of your armchair. Made by Fibrum, this app will have you leaning from side-to-side and gasping with excitement as you complete loop-da-loops and corkscrews. For added escapism, the ride is set in a tropical jungle and even goes underwater. There are lots of roller coaster simulators on the Play store, but this is the one we most enjoyed – though it's also the one that must us feel the most sick!



Seene

Free

Seene was giving Android users the chance to snap and share 3D photos long before Cardboard was a glimmer in Google's eyes. However, it also includes a View in Cardboard mode, so any image shared on the social network can now be viewed in your virtual reality headset. If you lack the funds (or the skills) to operate a Jump camera, this is a great alternative for sharing your own VR experiences as well as get an idea of what the Expedition program is like.

with apps. To combat this, Google launched the Works with Cardboard program in April. This enables manufacturers to input their key parameters – such as focal length and inter-lens distance – and receive a QR code to place on their device. Users can then scan this code using the Google Cardboard app, and their VR experiences will be optimised for the viewer. Also, if you're thinking of buying a Cardboard headset, look out for the Works with Cardboard badge to ensure that the product has been certified by Google.

DODOcase, Knox Labs and I Am Cardboard have all signed up. Dalton stresses the benefit of working with Google rather than alone. "Google and DODOcase share a similar vision as to where the market can go," he says. "Google's support of the software development community is critical in increasing the number of VR applications and the quality of those applications. Our collaboration is a circle where top-quality viewers lead to more use of software and top-quality software will lead to more viewer sales."

While manufacturers have been creating new viewers, app developers have been experimenting with different kinds of virtual reality experiences. There are now 500 Cardboard-compatible apps on the Play store, including tours of the solar system in Titans of Space, 3D live performances from Paul McCartney and Jack White, as well as games, such as ghost story Sisters by Otherworld Interactive and space shoot'em up Vanguard V.

Critics might argue that even Cardboard's most sophisticated apps and games don't offer more than a 30-minute experience. This is little more than a gaming demo and isn't going to attract the sort of hardcore gamers that are used to playing Skyrim or Destiny on a games console. Currently, Oculus doesn't offer games that are much more in-depth either, but it has recently invested $10 million to help developers and is working with some of the world's biggest gaming studios, including Square Enix, the creators of the phenomenally popular Final Fantasy series.

> "While manufacturers have been creating new viewers, app developers have been experimenting with virtual reality experiences"

In contrast, Google hasn't created a fund to support developers, but continues to make lots of tools available to developers for free, including the new Google Design Lab app. This app includes user guidelines for creating VR experiences. The company also continues to hire internally, for instance, it bought up the company behind Tilt Brush, a 3D painting app.

Craig Dalton is very optimistic about the money to be made as a virtual reality app developer. "Today, developers have a green field opportunity. I'm encouraging our partners to 'go, go, go!'" he says. "There will be new multimillion dollar development organisations created in VR, the only question I have is who they will be."

Robert Mao, the founder of mobile development company Pixomobile, cancelled his pre-order of the Oculus Rift Developer Kit 2 after trying Cardboard. "I actually don't think Cardboard is better than the Oculus Rift itself, but based on the reason why I want to buy a Oculus Rift DK -- to test out prototype developments – Cardboard works better: it's much cheaper, it has decent quality. Most important, it will be much easier to develop a prototype and let many people test it, this is the killer part," Mao said. "It's much easier to find testers – you can even give away Cardboard along with your beta apps, there is no way to do it with Oculus," he added.

Virtual reality YouTube

However, being able to view virtual reality videos on Cardboard is so 2014. Google thinks it's time to share your own. You could already view panoramic PhotoSpheres that you'd captured with your stock Android camera in Cardboard, however, this was imperfect and sharing them was difficult. Google's new system, called Jump, has been designed with Cardboard in mind, to specifically capture and

Google teamed up with GoPro to produce the Jump camera, which makes it easier to capture virtual reality videos

Make your own VR videos

Watch Mike and Maggie's Cardboard engagement here https://goo.gl/bQN64m

Multimedia designer **Mike Rios** proposed to his girlfriend Maggie using Cardboard. We asked him how he did and what he thinks of Google's new Jump camera…

Why did you propose using Cardboard?

A I'm equal parts designer and tech dork; and a huge fan of pick-up and play disruptive open technology like Android and Cardboard. I quickly realised Cardboard's incredible power to transport and alter the perception of anyone with a modern smartphone, some cardboard, and lenses after its debut at I/O last year. Around the time I was just starting to plan my proposal to Maggie. Up to that moment I knew I wanted to propose to Maggie with all of our family and friends in a big grand gesture. I also really wanted to surprise her while playing with her expectations to create an experience she would never forget that was also super creative, and Cardboard just seemed like the perfect way to write my love note to her.

You created your proposal using PhotoSpheres with no experience using Cardboard. Would it be easier to use Google's new Jump camera?

Mike (far left) proposed to Maggie using Cardboard VR

A To be honest, I don't know a whole lot about Jump myself. As I understand it, in addition to needing 16 GoPros and a custom rig you need some serious server power to process any video you make with it, which sounds problematic for the average consumer. To me it sounds like they have some plans in the short term with some well known film makers, which makes business sense as it feels more commercial in nature now. Whatever the case I'm definitely interested to see where it goes from here, maybe it'll be there for the layman in a year or two.

Is the future of virtual reality in DIY experiences or is this a stop-grab for more advanced developments?

A I don't see why they both can't co-exist! I mean there will definitely be large Hollywood-style blockbusters and experiences in VR, but there will also always be room for tons of smaller DIY experiences. If anything, companies like Google have widened the field for everyone in everything (applications, videogames, film, and music). That's Google's real super power here, disruption, and I'm ready and waiting to jump into the spaces they open up with things like Cardboard!

What was it like to get a shout-out from Clay Bavor in this year's Google I/O keynote?

A We actually knew about the shout out well before it happened! [Google] emailed me a few weeks before the event and asked if they could use it in the keynote, and given all of the help they provided through sponsorship, it was the least I could do! It was super exciting.

create VR experiences, and then share them with the whole wide world.

"We want to put professional, previously impossible tools in the hands of any creator who's motivated," says Clay Bavor, "so that they can capture the world around them and then share it in a way that lets all of us jump to the top of that mountain, jump to any place or event on the planet and experience those sights and sounds as though we're actually there."

So how do you shoot VR videos? The answer is simple: with 16 cameras working together as one. Google has developed the Jump camera, an elaborate camera rig that can capture 3D worlds. The first array has been produced in partnership with GoPro, famous for its wearable action camcorders. But no on sale date or price has been announced, instead you can apply online and Google says it will provide rigs to 'select creators'.

In theory though, wannabe VR filmmakers could use any type of video camera and even make their own rigs. Bavor said they experimented with arrays made from 3D-printed plastic, machined metal and – of course – cardboard, while testing out the product. "What's critical is the actual geometry and we spent a lot of time optimising everything," he says. "The size of the rig, the number and placement of the cameras, their field of view, relative overlap – every last detail," he adds. Just as it made the template for the original Cardboard open-source, Google will make this geometry available to everyone later this summer.

However, the next step of the Jump process relies on Google software. Called 'The Assembler', this program stitches the 16 raw videos into a seamless panorama with thousands of in-between viewpoints. These videos are very high resolution – the equivalent of five 4k TVs playing at once.

The final, and important step, is to then make your VR video available to everyone. Rather than build an app from scratch to showcase your VR experience or install an all-new player app, Google will be making Jump part of YouTube in the near future. You will then be able to search for VR experiences alongside ordinary videos on your phone, before donning your Cardboard headset. With Google's new Cardboard headset and Jump camera, it has never been easier to become a member of the virtual reality fold. ■

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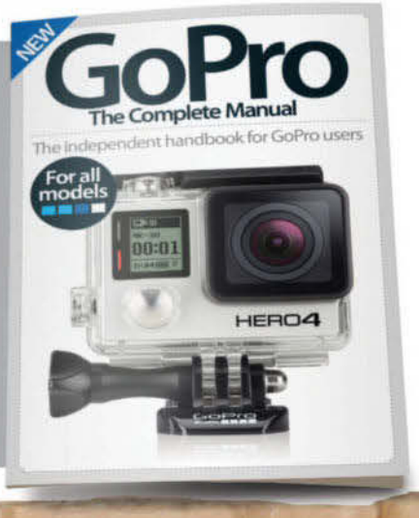

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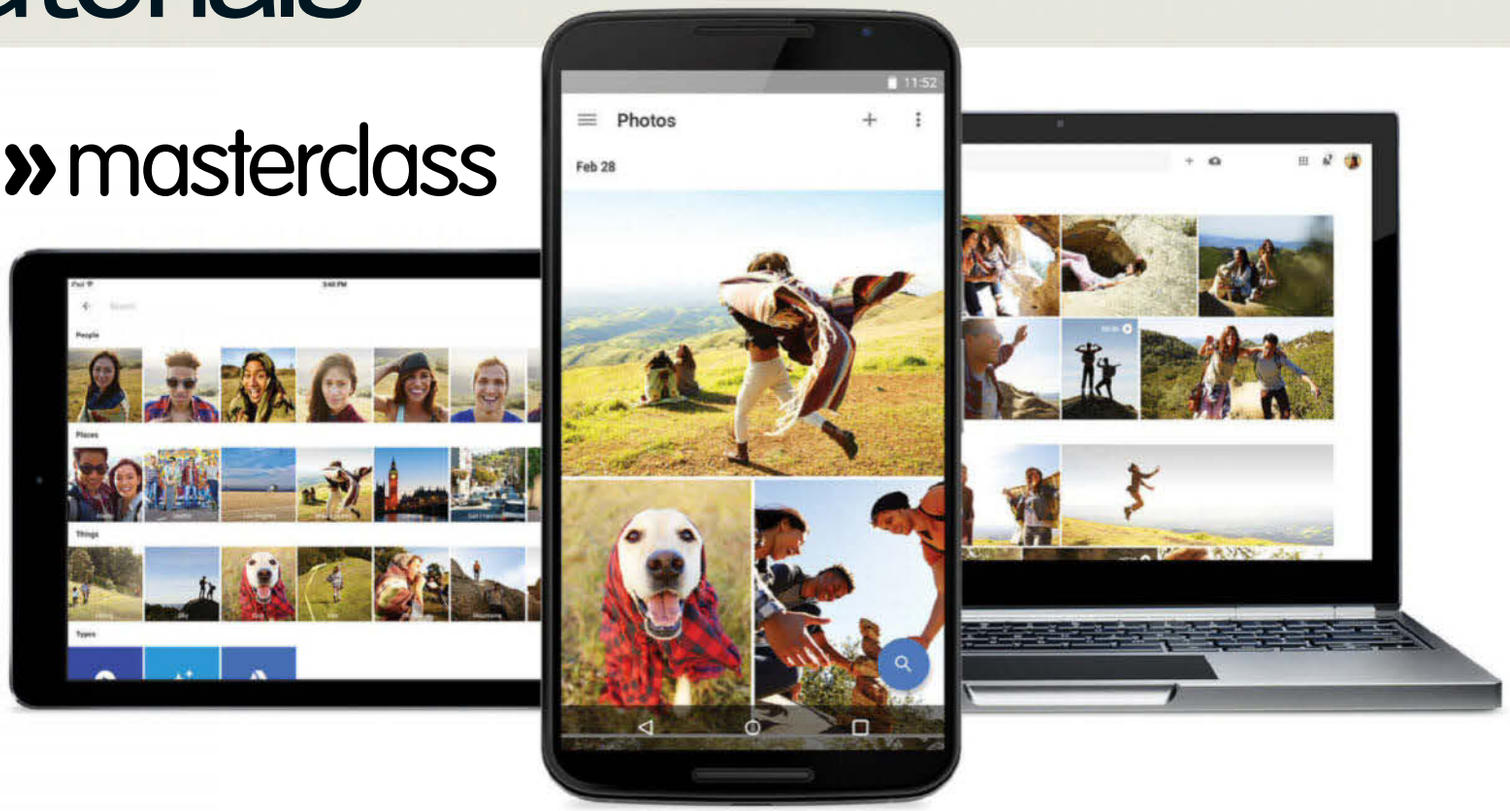


Get started with Google Photos

Offering unlimited storage and a wide range of tools, Google Photos is more than just a gallery app

Google has relaunched Photos as a standalone service, no longer part of its Google+ social network. Intended as a competitor to Dropbox and Flickr and, indeed, Apple's own cloud storage service also called Photos, Google has made Photos completely free with no limit on the number of images you can upload.

Not only does this include support for up to 16MP pictures and 1080p high-definition videos, but it includes a some clever tools for sorting your files by the date and location of where they were taken, as well as turn them into collages and create animations. Photos also works across Android, desktop and even iOS, so your pictures are always accessible.

Explore Automatic Sorting

Access and edit the categories that Google Photos creates automatically

Navigate to categories

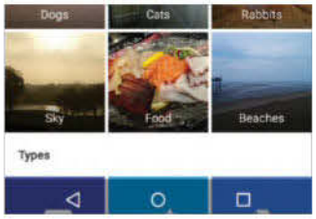
Search icon

To view the Places and Things categories, tap the blue magnifying glass in the bottom-right corner throughout the app, including in the Assistant, Photos and Collections areas.

How these categories work

Automatic sorting

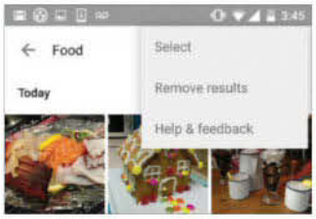
Places uses location data to group photos and videos based on where they were taken. Things groups your media based on contents, though rogue photos can appear in the wrong place!



Perfect your categories

Remove results

You can remove media that have ended up in the wrong category. Open the category in question, tap the menu icon and Remove results. Tap the items that shouldn't be there, then Remove.



Five ways to set up and explore Google Photos

1. Get all of your Google Photos content through Google+

You can view all your Google Photos media on any computer via your Google+ account. Log into your account, then navigate to the Photos section and you'll see all your synced Google Photos content.

2. Access your content through google.com/photos

Alternatively, you can access your synced Google Photos content on your desktop, by going directly to **goo.gl/8YHYVw** and then logging in with the email address that you use for your Google Photos account.

3. Desktop uploader

Do you regularly transfer photos from your digital camera to your computer? Then you may want to use Google Photos' desktop uploader (goo.gl/nbhvXQ) which automatically adds the photos and videos stored on your computer to your Google Photos account.

4. Set up desktop uploader

Once you have installed the desktop uploader, launch it and log in with your main Google Photos email address. Then, choose which folders you want Google Photos to start automatically backing up.

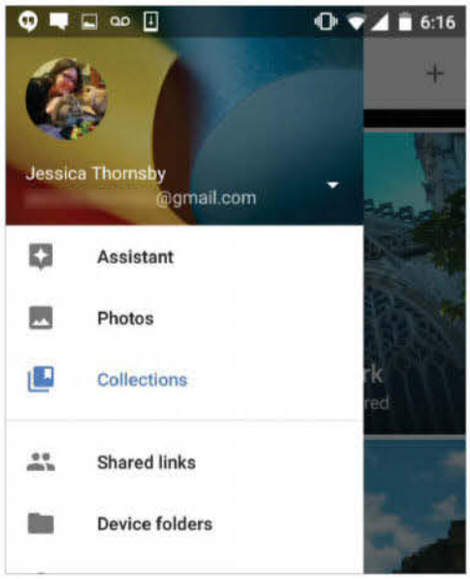
5. Google Photos across devices

You can upload photos from all of your devices, from phone to tablet. Google Photos provides a lifetime of back up, so your photos will be safe if anything goes wrong and you can make edits to perfect every image.

Set up Google Photos

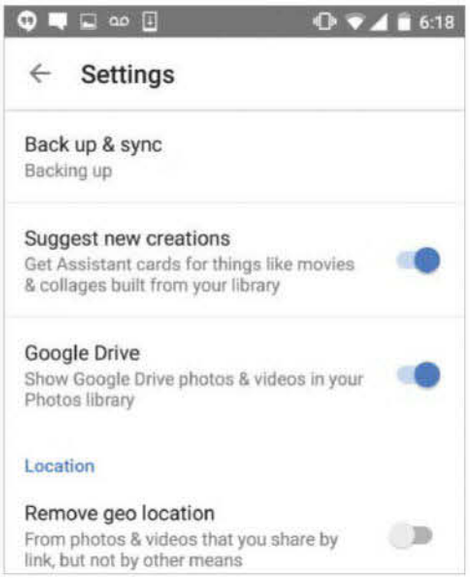
Create your unlimited account on Android

As part of Google's suite of apps, chances are you already have Photos installed, so just check it's up to date. If not, you can grab the app from Google Play. Launch Google Photos, open the main navigation menu by tapping the menu icon in the upper-left corner, and let's get started!



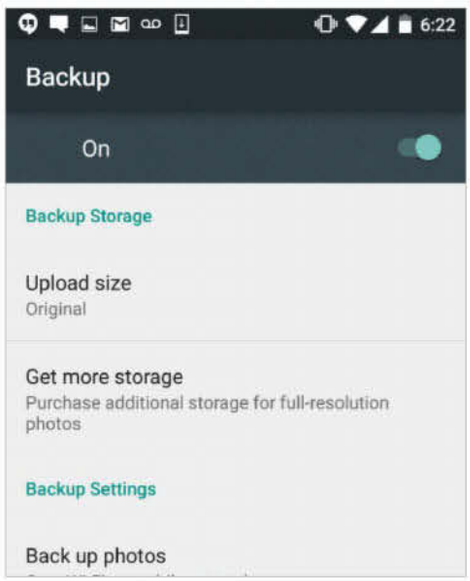
1 Choose an email address

Photos usually picks up on your email address and creates an account for you – you'll find this email address in the menu's header area. To use a different email, tap the header area, select Add account and follow the instructions.



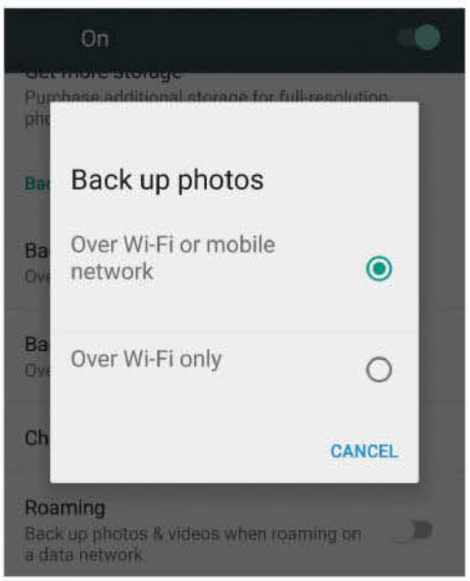
2 Back up and sync

Photos syncs the media on your device, so you can access your photos and videos anywhere by logging in with the same email. To turn this backup off, open the menu, select Settings, tap 'Back up & sync' and set the 'On' slider to 'Off'.



3 What resolution?

Using Photos, you can store unlimited media for free at 16MP (High Quality) or you can opt for a higher resolutions (Original) but this does count against your Google Drive quota. To switch between Original and High Quality, tap Upload size.



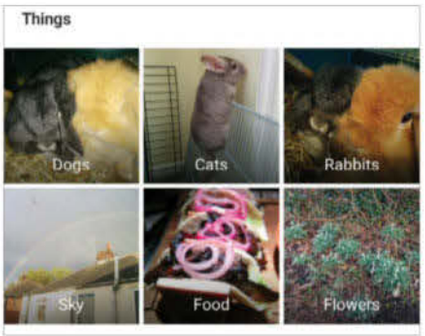
4 Other useful settings

Here, you can purchase additional storage ('Get more storage') or tell Photos to sync certain folders ('Choose folders to back up….'). If you're worried about Photos eating into your data, tap 'Back up photos' and then select 'Over Wi-Fi only'.

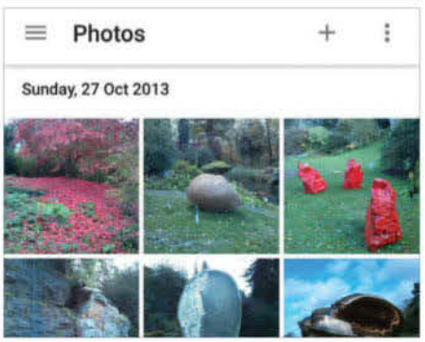
27 min guide

There are a few areas of the Google Play app that you will want to get to grips with straight away

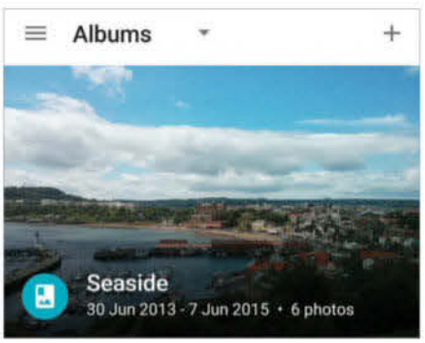
A guided tour of Photos' features



1 All your collages and animations are stored in Creations. To navigate to this area, tap the blue magnifying glass icon and then tap Creations.



2 To see all your media arranged chronologically, tap the Photos option in the menu. Then tap the menu icon and switch between Day view and Month view.



3 Collections is a really interesting area of Google Photos. Open it, then tap the text in the toolbar to switch between All, Albums, Movies and Stories.

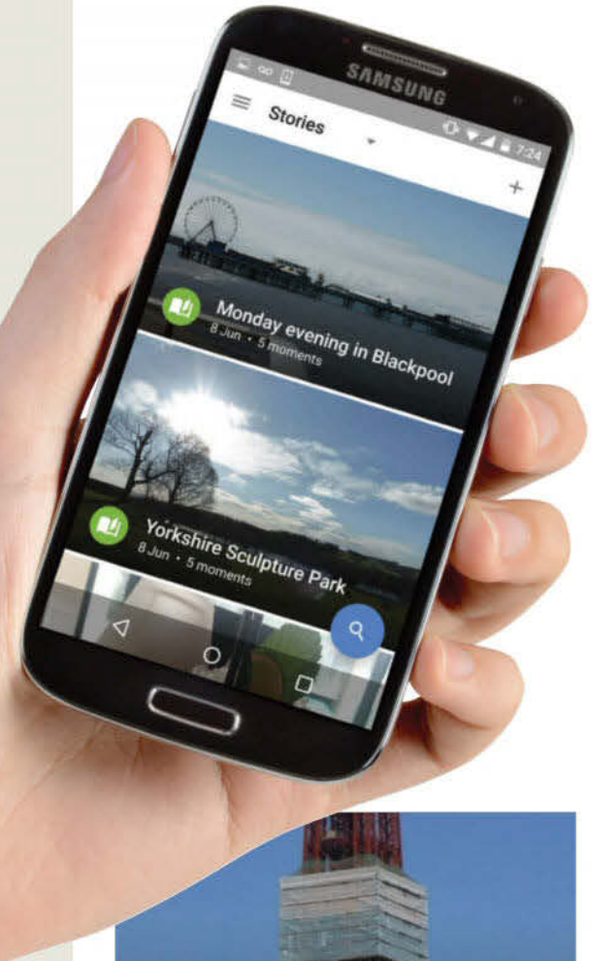
Turn your photos into collages, stories and more

Smartphones and tablets mean it's never been easier to take photos and videos, but what do you do with all this content? The Google Photos app gives you lots of creative ways of enjoying your photos and videos.

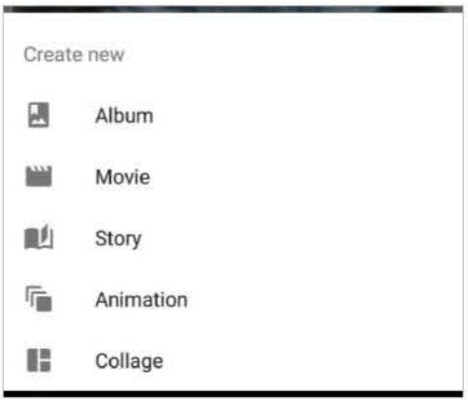
Using Google Photos, you can combine your media into animations and collages, or if you have related photos or videos you may want to arrange them into a stand-alone story, complete with descriptions and location tags.

You can create these animations, collages and stories yourself, but the Google Photo app also takes a proactive approach and will occasionally create animations, collages and stories for you.

In this section, you'll look at how to create and view animations, collages and stories, before taking a closer look at how to add descriptions and locations to your stories.

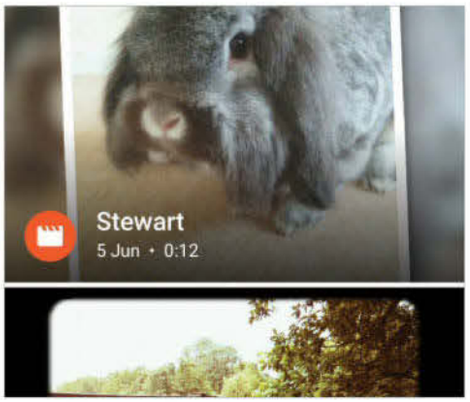


Check out the creations that Photos cooks up automatically and then produce your own



1 Start to create

To compile a story, animation or collage, navigate to the Assistant, Photos or Collections area and tap the + that appears in the toolbar. Choose either a Story, Animation or Collage, then tap all the media you want to use and tap Create.

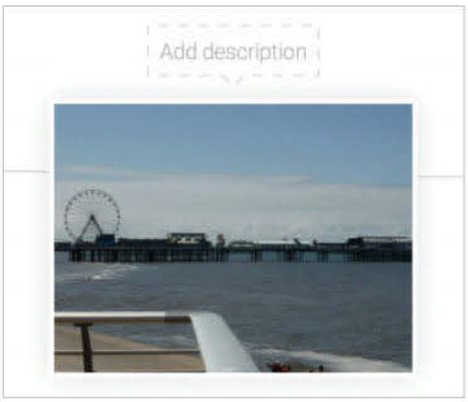


2 View your creations

To view all your Google Photos creations, go to either the Assistant, Photos or Collections area of the app, then tap the blue magnifying glass icon in the bottom right of the screen. Scroll, then tap Creations towards the bottom of the screen.

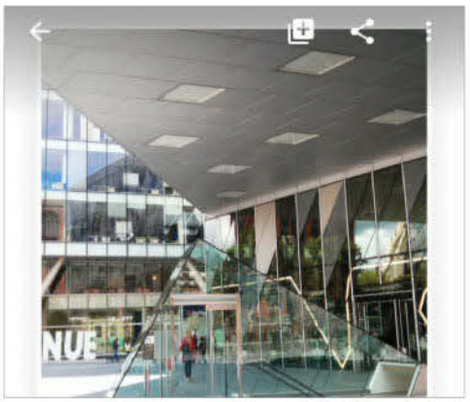
3 Edit your stories

You can edit stories in several ways, so start by navigating to Collections. If you don't see any stories, tap the toolbar text and select Stories. Each story gets a default title which you can edit by opening the story and tapping the title text.



4 Add descriptions

To add descriptions, open your story then left-swipe so you see all the photos and videos that make up your story. Move around these items by dragging on screen. To add a caption, tap Add description and enter your text.



5 Edit or remove locations

Photos tries to assign a location to each image, or group of images, that make up your story. To edit an assigned location, tap the location tag and select a new one. Alternatively, to remove location information, tap 'Hide this location...'

Message us!
Got any Google Photos tips? Let us know online

facebook /littlegreenrobot
Get help from our Facebook community

twitter @lgrobot
Follow us to send your questions and thoughts

Share your photos online

Pro tips for posting your creations to Facebook from Google Photos

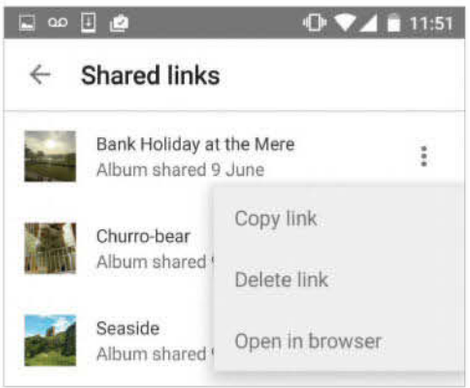
Part of the fun of photos and videos is sharing them with other people. In Google Photos you can share individual photos, videos and creations in all the usual ways, such as posting them to Facebook and Twitter. But you can also share entire albums as well as the collages and other creations you've produced in Photos.

To share the contents of a Google Photos album or story, you can create a link and share this link with others. Anyone who has the link just needs to open it in their web browser and then they will be able to see the entire contents of your Google Photos story or album.

In the following tutorial, you will learn how to use this Get link functionality to share large volumes of photos and videos to all of your friends and family.

1 Share an album or story

Navigate to Collections and open the album or story you want to share. Tap the share icon and select Get link. This creates a link to the album or story and copies it to your clipboard. You can then paste this link anywhere you want.



2 Delete album or story link

At some point you may want to stop people from accessing a shared story or album via its link. To do this, open Photos menu and tap Shared links. Find the link in question, then tap the three-dotted menu and select Delete link.

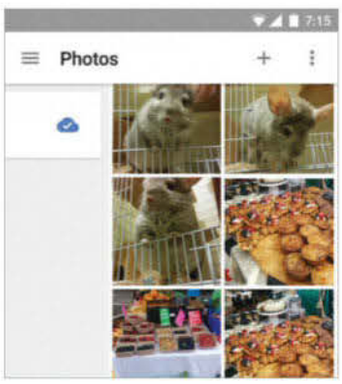
3 Share multiple media

When you only want to share a handful of items it doesn't make sense to create a full album or story. Instead, long-press on the first item you want to share, then tap the rest of the photos or videos, before hitting that share icon.

2 min guide

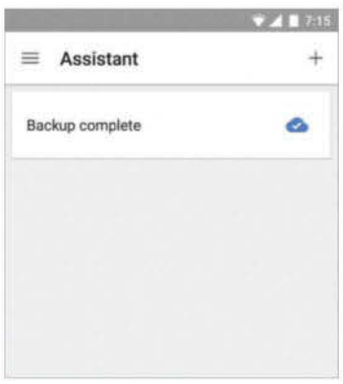
Using Google Photos' Assistant

Initially your Assistant area may be empty, but don't overlook this helpful feature!



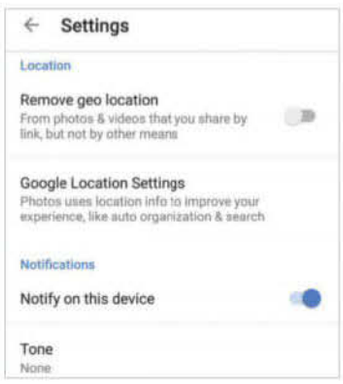
1 Access Assistant

You can access the Assistant from the Google Photos side menu, or if you're in the Photos or Collections area you can right-swiping once or twice across the main portion of the screen, until you see the Assistant area.



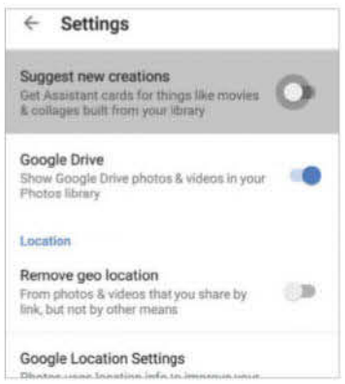
2 View alerts

The main Assistant screen is where you'll find all Google Photos' recent notifications, such as a heads-up about any new creations that Assistant has cooked up for you. Tap to act on a notification or swipe to dismiss it.



3 Customise alerts

The catch is that in order to see these alerts, you need to remember to keep checking the Assistant area. If you'd prefer to receive these alerts as app notifications, go to Photos' Settings and enable 'Notify on this device'.



4 Turn off creations

In Settings, you'll also find the 'Suggest new creations' slider. If you're not a fan of the collages and animations Assistant automatically creates, you can disable this feature by tapping the 'Suggest new creations' slider so it's set to off.

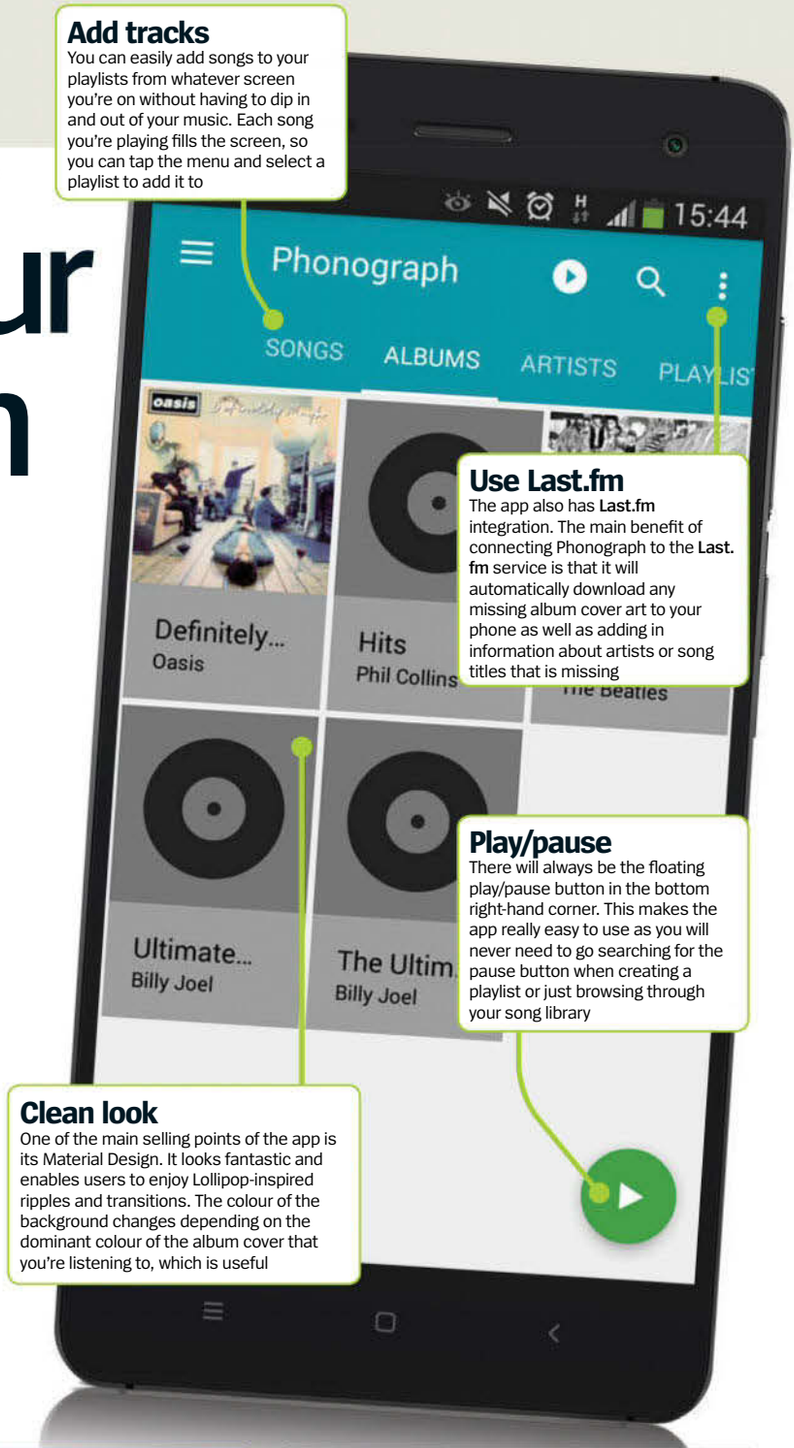
App used » Phonograph Music Player **Works with** » Android 4.1 and up

Organise your playlists with Phonograph

Enjoy the fresh look and feel of this Material Design music player app

Mobile music players can be tricky apps to negotiate. It is easy to get lost in a sea of album covers, playlists and artists. If you find this, then Phonograph Music Player might be the one for you. At time of writing it is still in its beta phase with more features being promised, but right now it is a simple, attractive, easily-navigable music player. It works alongside Last.fm, giving users photos and biographies of the artists that they're listening to. The always-there play/pause button also enhances the user experience, making Phonograph a truly enjoyable app to use. If you are a technical music fan, you can also change the equalisation of individual songs to increase or decrease the bass at output of certain frequencies, enabling you to create your very own versions of your favourite songs. This tutorial will show you how to organise your music onto the app as well as how to construct playlists, jump to artists straight from their song and tag your music for much easier future navigation.

> "If you are a technical music fan, you can also change the equalisation of individual songs"

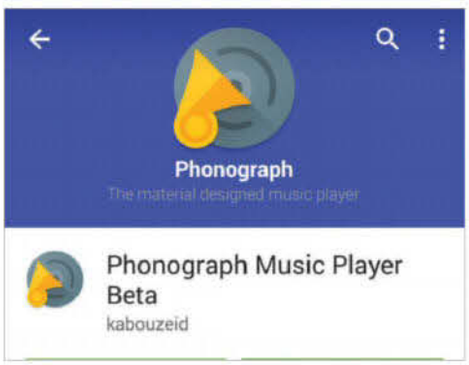


Add tracks
You can easily add songs to your playlists from whatever screen you're on without having to dip in and out of your music. Each song you're playing fills the screen, so you can tap the menu and select a playlist to add it to

Use Last.fm
The app also has **Last.fm** integration. The main benefit of connecting Phonograph to the **Last.fm** service is that it will automatically download any missing album cover art to your phone as well as adding in information about artists or song titles that is missing

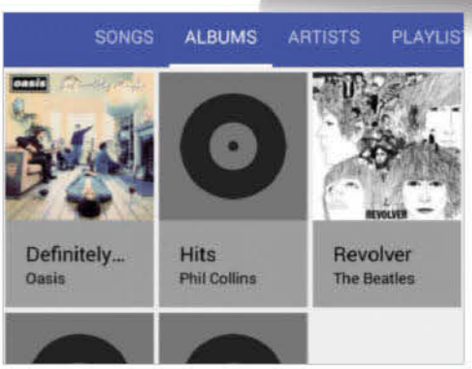
Play/pause
There will always be the floating play/pause button in the bottom right-hand corner. This makes the app really easy to use as you will never need to go searching for the pause button when creating a playlist or just browsing through your song library

Clean look
One of the main selling points of the app is its Material Design. It looks fantastic and enables users to enjoy Lollipop-inspired ripples and transitions. The colour of the background changes depending on the dominant colour of the album cover that you're listening to, which is useful



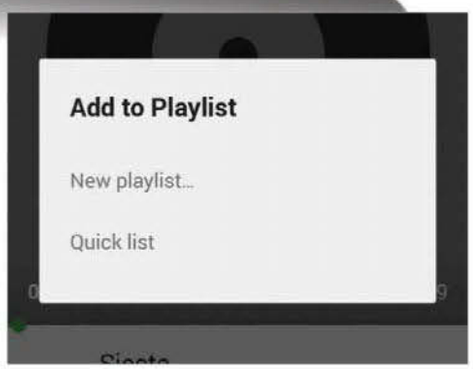
1 Get the app and music

Head to the Google Play store and download 'Phonograph Music Player Beta'. Ensure you have music downloaded on your phone. Unfortunately music downloaded from Google Play Music won't play on Phonograph, so you may have to download tracks from another service.



2 Sort your music

You will see a screen featuring all your music. Tap on the word Songs, Albums or Artists to access your music sorted into those categories. Playlists is an option but you won't have any set up yet. You can also access these groups by tapping the three-line menu in the top-left corner.



3 Build a playlist

Head to the Songs menu and tap on the three-dot menu on the right-hand side of one of your songs. Select the 'Add to Playlist' option and that will bring up another menu where you can decide whether to add it to an existing playlist or create a new one.

5 quick tips: A few tips for listening to music onto your phone

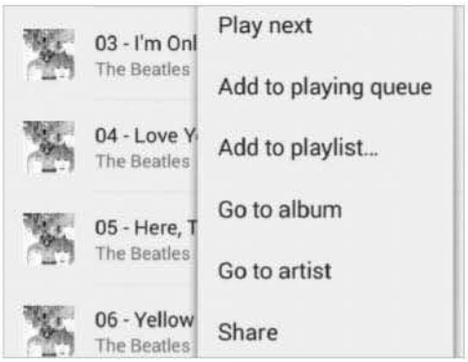
1 Find free websites
There are free websites you can visit that let you download up-and-coming artists' music free.

2 Try streaming sites
Services like Spotify and **Last.fm** let you stream music through your phone without downloading it.

3 Only use trusted sources
Some sites will lure you in with free music but infect your phone with malware instead.

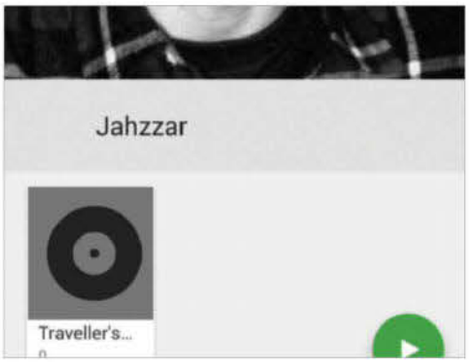
4 Download in free trials
Many sites will offer an introductory free trial. Make the most of this while you can.

5 Discover new music
Most music apps have a sharing option so you can recommend songs to your mates.



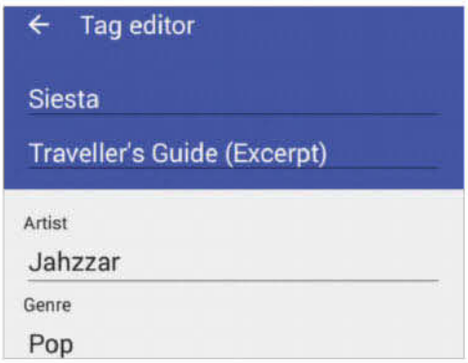
4 Create a playing queue

If you want to play a certain selection of songs but don't want to create a playlist, you can add tracks to the playing queue. Tap the three-dot menu at the side of the song again and choose 'Add to Playing queue'. Phonograph will then play that track next.



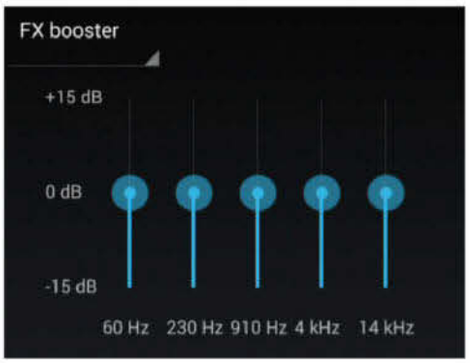
5 Go to artist

If you hear a track from an artist and want more, there is a quick move option available. Tap on the three-dot menu again and select 'Go to artist' or 'Go to album'. The app will take you to your requested destination and play music from that artist or album.



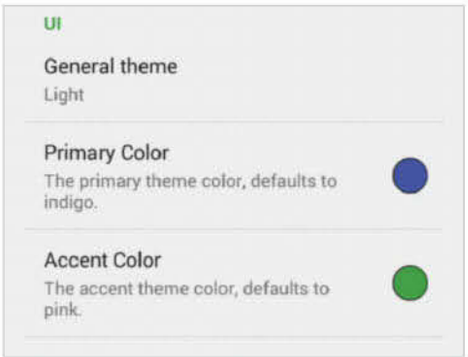
6 Add tags to your music

Tap on the three-dot menu next to a song and scroll down to Tag editor. From here you can add in certain tags, such as the song title or the artist, for example. This is especially handy if you've downloaded music without that information, as you will probably need it.



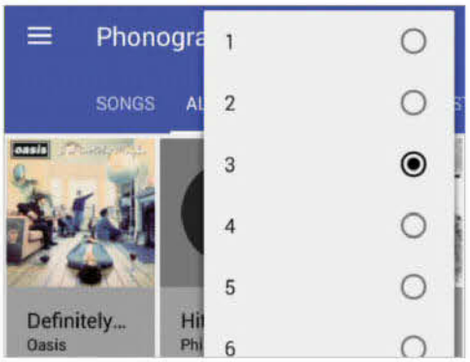
7 Edit your music

Tap the three-dot menu in the top right-hand corner of the app and hit Equalizer. Press the Off button to turn it on and play around with the FX and boost levels. Unfortunately you can't edit tracks on a song-by-song basis so may have to change it regularly.



8 Change the design

Tap the three-line menu in the top-left corner and then hit Settings. From here you can edit the look and feel of the app. You can change the colour scheme, the transparency of the toolbar and what page the app opens onto. This customisation keeps the app fresh.



9 View your albums

Tap on the Albums category header. Next, tap the three-dot menu in the top-right corner or the menu button of your phone. This will bring up a menu that has an option called Grid columns. Tap on that to choose how many album covers you want per row.

faq

Ask your own question online at **littlegreenrobot.co.uk**

What does beta test mean?

It means that the app is still in the development phase, so there may still be a few bugs to work out and changes to be made. You shouldn't lose your settings, such as playlists and album covers, once it becomes a fully-fledged app, unless a particular feature of the app gets removed in the period between the beta test finishing and the final product being rolled out fully.

Why can't I find my Google Play Music on here?

Unfortunately, Google Play is its own standalone app and when you download music from it, the music is downloaded to the app, rather than your phone. Therefore, it isn't available for Phonograph to see when it searches your phone for music. It's a bit like searching your computer's hard drive for a file that is stored on your email account, for example.

Need help?

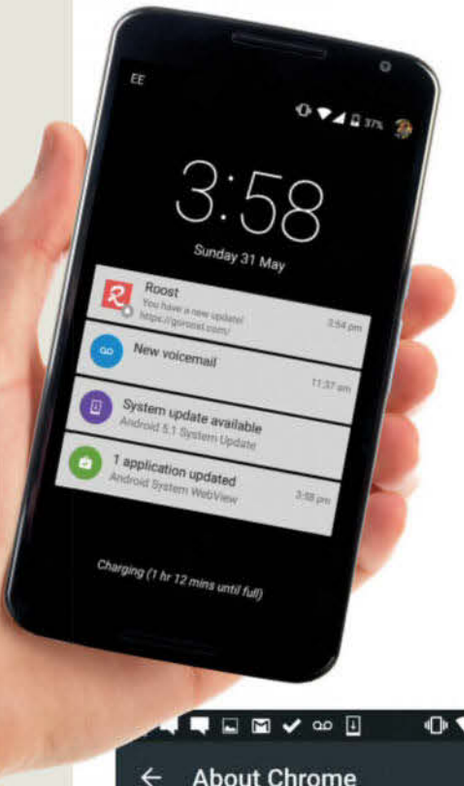
Got a problem with your Android phone or tablet? Get in touch with us...

facebook
/littlegreenrobot
Get help from our Facebook community

twitter
@lgrobot
Follow us to send your questions and thoughts

email
qa@littlegreenrobot.co.uk
Send your questions for our team of experts to tackle

App used » Chrome **Works with** » Varies with device



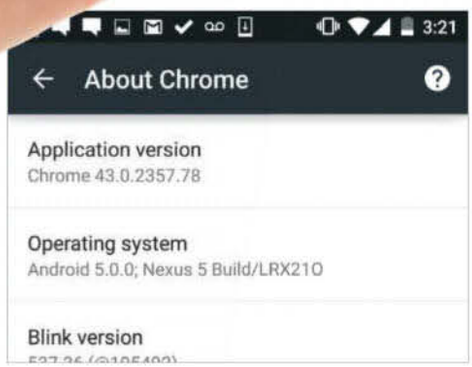
Get notifications from websites

Get automatic updates about websites on your lockscreen and notification drawer

Notifications are a quick and easy way of seeing exactly what's going on in your Android apps. With a recent update to the Chrome app, Google are expanding notifications to the World Wide Web. A new push notification feature will gives online services the power to send alerts to your device about updates to their websites. For example, a shopping website might use notifications to give you a head's up about any sales that are coming up.

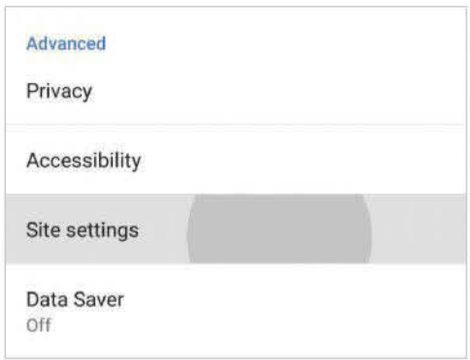
If this sounds like a good way to swamp your device with notifications from all corners of the web, don't worry – this is strictly an opt-in service, so you'll only receive notifications from the websites that you have explicitly approved.

While it's still early days for browser push notifications, popular websites including eBay, Facebook and Pinterest have announced they'll be supporting push notifications, so this is the perfect time to get to grips with this new feature.



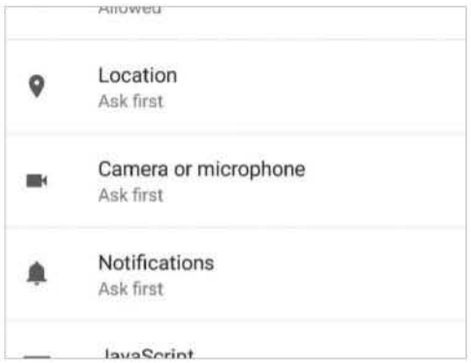
1 Check your Chrome app

Ensure you have at least version 42 of the Google Chrome app installed. To check, launch your Chrome app and tap the menu icon in the top-right corner. Select Settings>About Chrome. The version number is under Application version.



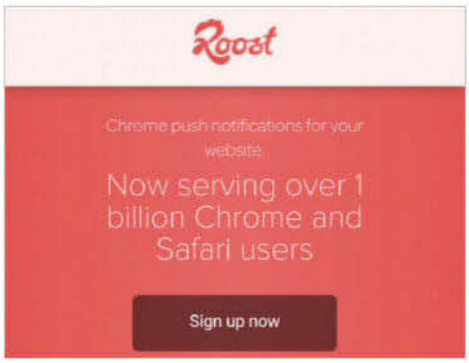
2 Open Site settings

Currently notifications for Chrome are not automatic, so you will need to opt in. To check that notifications are enabled for your Android device, open Chrome's menu and then select Settings>Site settings.



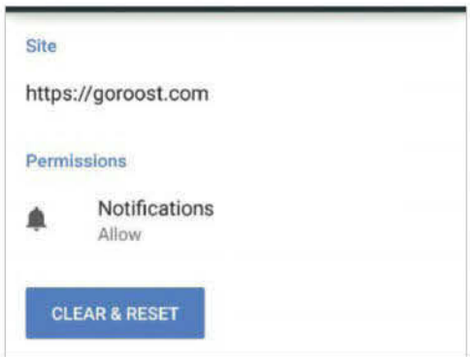
3 Enable push notifications

Make sure Notifications is set to Ask first. If it's set to Blocked, tap this option and push the slider into the on position. Note, if you ever want to disable all website push notifications, return to this screen and push the slider to off.



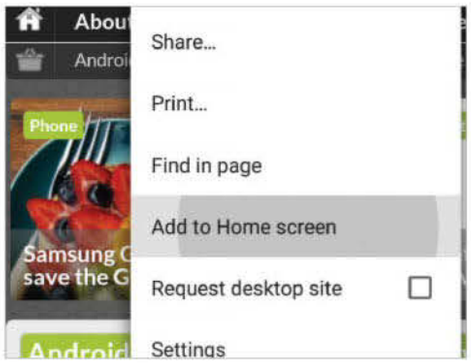
4 Agree to notifications

Once notifications have been enabled, whenever you visit a website that supports them you will be asked if you want to receive updates. Tap Allow and you'll get notifications on your lockscreen and notification drawer.



5 Clear and Reset

To double-check which websites can send push notifications, open Chrome's menu and select Settings>Site settings>Notifications. You'll see a list of all your websites. To remove one, tap and select Clear & Reset.



6 Add to homescreen

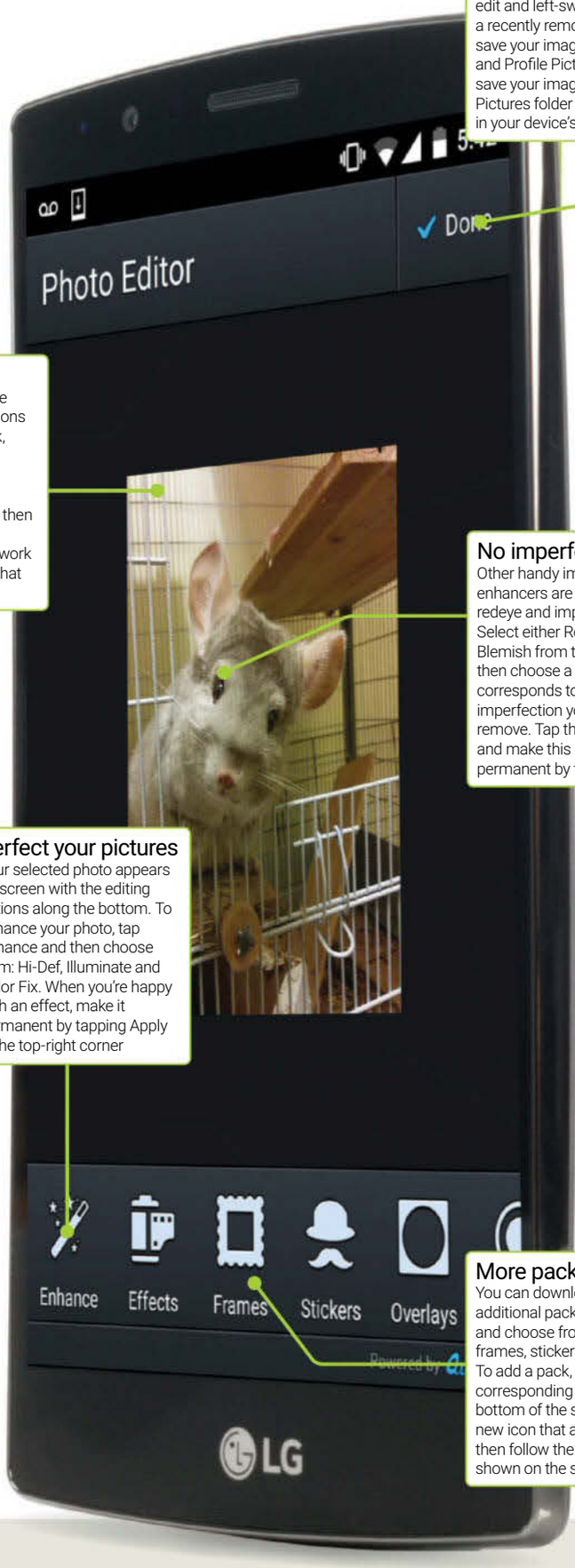
Another Chrome feature to help you keep track of your favourite websites, is creating a shortcut and then placing it on your homescreen. To do this, launch Chrome, go to the website, open Chrome's menu and select Add to Home screen.

Apps used » Profile Picture Editor **Works with** » Android 4.0 and up

Edit your profile pictures

Download and edit photos directly from your various social media accounts

We may be storing more and more photos across various social networks, but the image-editing options that are available to your typical social network are still fairly limited. While you could download photos from your social accounts, store them on your Android device and then use a separate image-editing app, there are some apps that help streamline this process. Profile Picture Editor is one such app. It connects directly to your account on the best social networks, including Facebook, Twitter, Instagram and Google+, so you can edit any of the photos stored there without having to leave the app. Profile Picture Editor also has a good range of editing features, which should be more than sufficient for most of your basic photo editing needs. You can download this app for free from the Google Play store.



Undo and redo

This app has a handy undo/redo shortcut. Just right-swipe to remove the last edit and left-swipe to reapply a recently removed edit. To save your image, tap Done and Profile Picture Editor will save your image to a new Pictures folder that is stored in your device's Gallery

Find a photo

When you first launch the app, you're given the options of logging into Facebook, Twitter, Google+ or Instagram. Log into the network containing the images you want to edit, then tap 'Choose from social network', select your network and then find the photo that you want to edit

No imperfections

Other handy image enhancers are removing redeye and imperfections. Select either Redeye or Blemish from the bottom bar, then choose a circle that corresponds to the size of the imperfection you want to remove. Tap the imperfection and make this change permanent by tapping Apply

Perfect your pictures

Your selected photo appears on screen with the editing options along the bottom. To enhance your photo, tap Enhance and then choose from: Hi-Def, Illuminate and Color Fix. When you're happy with an effect, make it permanent by tapping Apply in the top-right corner

More packs

You can download free additional packs for this app and choose from effects, frames, stickers and overlays. To add a pack, simply tap the corresponding icon along the bottom of the screen, tap the new icon that appears, and then follow the instructions shown on the screen

More ways to perfect your pictures

Profile Picture Editor gives you lots of different ways to edit your images, including more experimental editing options that can create some fun effects

Create a Vignette effect

You can reduce the brightness around the edges of your image by tapping Vignette. A circle appears over your image and the effect is applied to everything outside of this circle. Position your circle and use the slider to alter the brightness.

Change the lighting

You can alter the levels of Brightness, Contrast, Highlights and Shadows, by tapping Lighting, making your selection and then using the slider to tweak the levels in your image. You can also combine options to create more unusual effects.

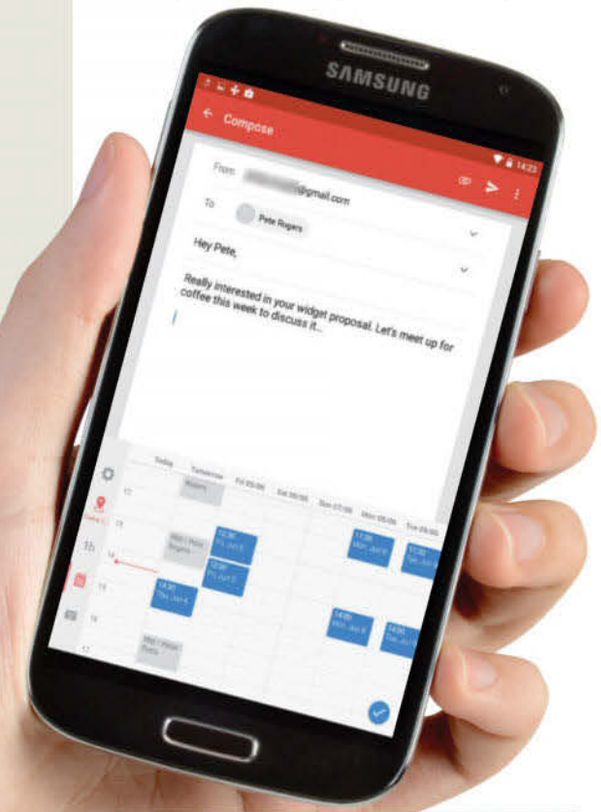
Experiment With colours

You can change the levels of Saturation, Warmth, Tint and Fade, by tapping Color. For a more dramatic effect, select Splash. Your image will turn monochrome. Next, select Free Color and drag across the screen to create lines of colour.

App used » Sunrise Calendar **Works with** » Android 4.0 and up

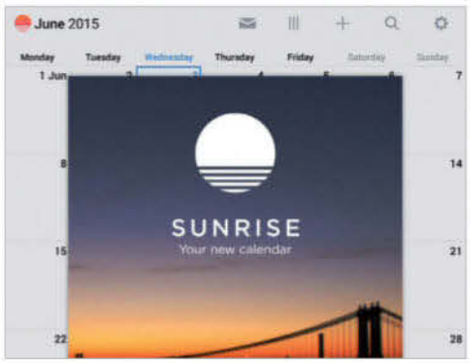
Make appointments in any messaging app

Sunrise Calendar's new Meet keyboard makes it easy to arrange meetings



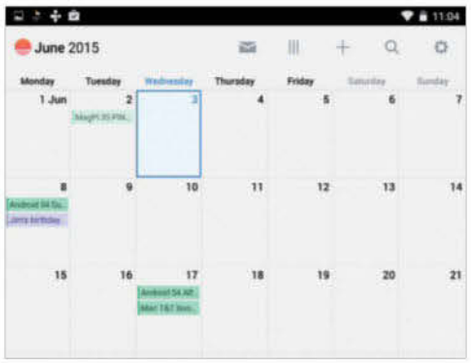
Switching between messaging and calendar apps to organise a meeting can be a pain. So is the necessity for ping-pong emails to decide on a time that's suitable for both parties. The ingenious new Meet keyboard solves both problems, making it quicker to arrange one-on-one meetings on your phone. The keyboard is included with Microsoft's free Sunrise Calendar app.

With Meet keyboard set up, whenever you're making plans via WhatsApp or even by email, you only have to select the bottom-right keyboard icon and it will replace your keyboard with a mini calendar. You can then choose a selection of free time slots, without having to leave the conversation. When the link is opened by the recipient they get to select a convenient time. The meeting will then be added to your calendar (and theirs if they use Sunrise). It's that simple.



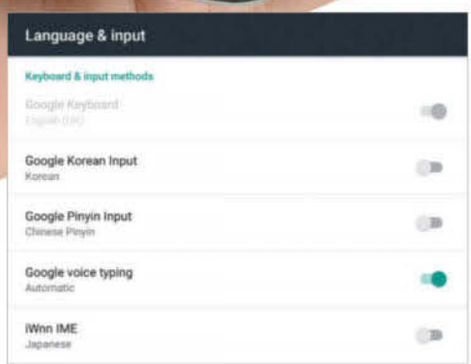
1 Open Sunrise Calendar

There's no need to download the Meet keyboard separately, since it's included with the Sunrise Calendar app – so either download that or update the already installed app to the latest version. If you haven't used Sunrise before, you'll need to sign in via Facebook, Google or Email.



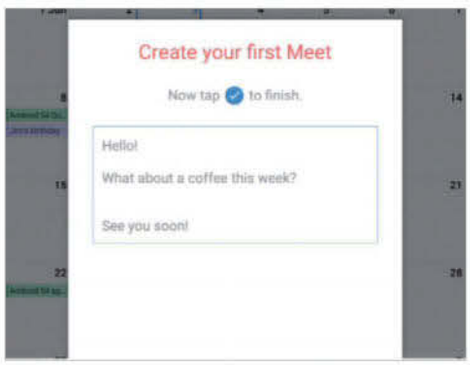
2 Discover Meet keyboard

After adding one or more calendar accounts, if you've never used Sunrise before, you'll arrive at the main calendar screen. A 'Discover our Meet keyboard' prompt should appear at the bottom; tap it to watch a short video about how Meet works and what its advantages are.



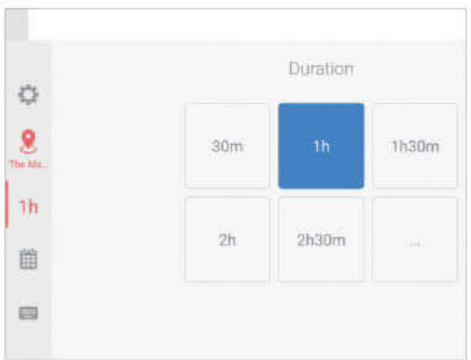
3 Enable the keyboard

Once the video has ended, you'll get a prompt to 'Get started with Meet'. To use the keyboard, you'll first need to enable it via the system language settings. Tap the Open language settings button, toggle the Sunrise Keyboard option to 'on' and tap OK.



4 A test message

You're then invited to create your first Meet, which is just a test message. Choose some time slots from the mini calendar, then tap the tick to confirm. Tap the link to preview what the recipient sees, then choose a time and confirm to set up the meeting.



5 Location and duration

You can now access the Sunrise keyboard while writing any email or message – just tap the bottom-right keyboard icon and enable it. Before choosing time slots, you can use the icons on the left of the mini calendar to select a location and set the duration.

5 quick tips

Some more tips for arranging meetings and handling events in Sunrise Calendar

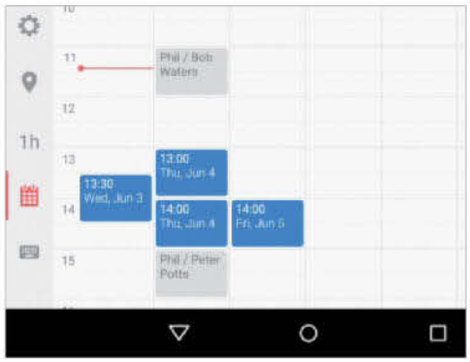
1 Add a location
Tap the location marker to the left of the Meet keyboard to list locations used previously in Sunrise.

2 Choose a calendar
To choose which calendar the meeting is added to, tap the cog icon at the left of the Meet keyboard.

3 Visible calendars
To choose which calenders are shown in Meet, tap the cog icon, then the Visible Calendars tab.

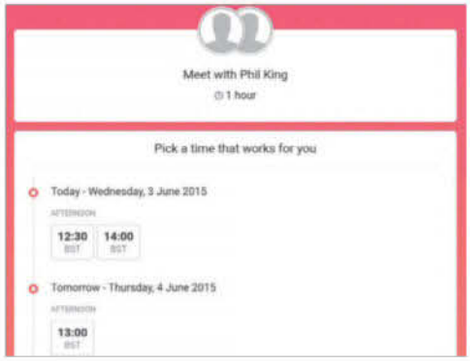
4 Back to keyboard
To instantly switch back to the default keyboard, tap the keyboard icon to the left of the mini calendar.

5 Multiple invitees
While Meet can only arrange one-on-one meetings, these can be edited later to add extra invitees.



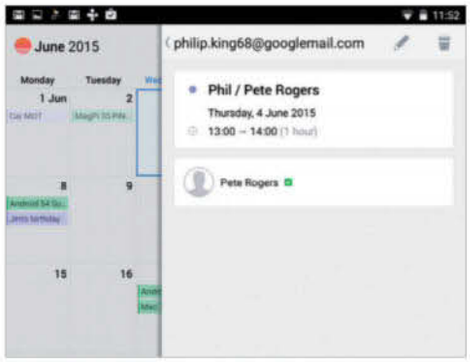
6 Choose time slots

As in the test example, you can now select some free time slots for the meeting from the mini calendar. Tap the tick to confirm and a link will be added to your message. The keyboard will automatically switch back to the default so you can add extra text.



7 Up to the recipient

If the recipient uses Sunrise Calendar (the mobile app or desktop web portal), your link will take them to it and show your suggested meeting times within it. If they don't use it, the times will appear on a webpage. Either way, they need to select a time and confirm.

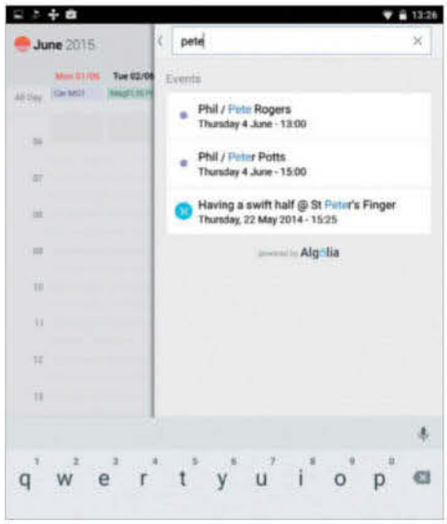


8 Notified and confirmed

Once the recipient chooses a time from the selection you sent them, a notification will be sent to you that the meeting has been confirmed at the selected time. Tap on this to see the meeting within your Sunrise Calendar app, where it has automatically been added.

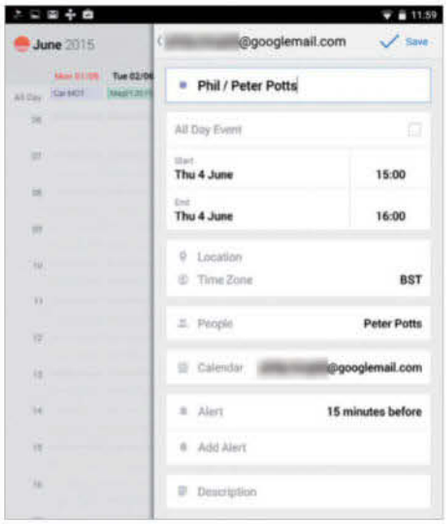
2 min guide: Edit meeting details in Sunrise

If you need to change the time of an arranged meeting, you can edit it just like any other calendar event that you make



1 Find the meeting

So, something else has come up and you need to alter the time for a meeting you've already arranged. First, open up the Sunrise Calendar app and find the meeting you want to change – you can use the search option at the top if you're having trouble finding it.

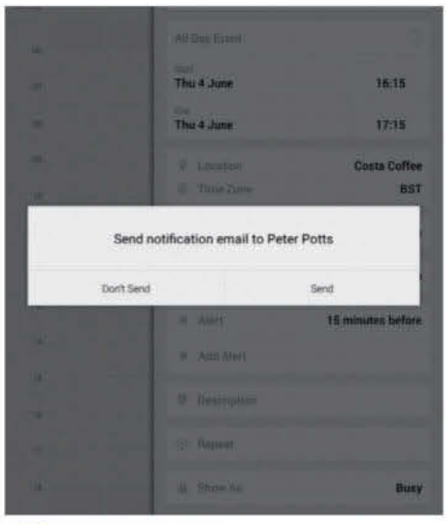


2 Edit the event

Tap on your meeting – in the calendar or search results – to bring up a summary on the right-hand side of the screen. You can now edit the selected meeting just like any other calendar event. Tap the pencil icon at the top to bring up all the details for it.

3 Change the time

Now tap on the start time to bring up a clock. Move the hand to select the hour and then to set the minutes. Once the time is set, tap Done. If you need to change the day of the meeting, tap the start date and then select a new one from the calendar pop-up. It is simple to adjust the details.



4 Notify the invitee

Make any other changes that you need to, such as switching the location or even inviting extra people. Then tap on Save at the top right to confirm the changes. You will now be prompted to send a notification email to the invitee(s); make sure you tap Send or else they won't be aware of the meeting.

App used » Nuzzel: News From Your Friends **Works with** » Android 4.0.3 and up

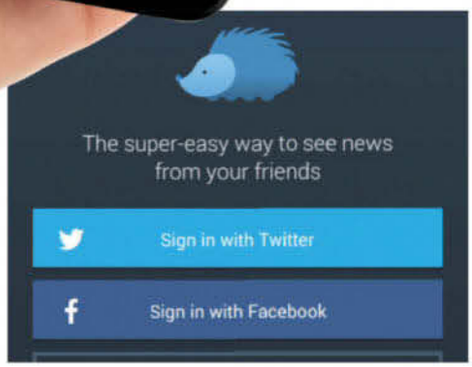
Get personalised news updates

Discover what news your friends are sharing with Nuzzel

News aggregating services like News360 or News Republic can take some time to learn what kind of news a user is interested in. Nuzzel: News From Your Friends, however, has quite a head start in this area because it brings you news from sources that it already knows you like and are interested in, specifically your friends on social media. If one of your Facebook friends or someone you follow on Twitter shares a particular news story, it will appear on the Nuzzel news feed. The apps assumption is that if your friends or follow with someone you will share similar interests and therefore be interested by similar news stories.

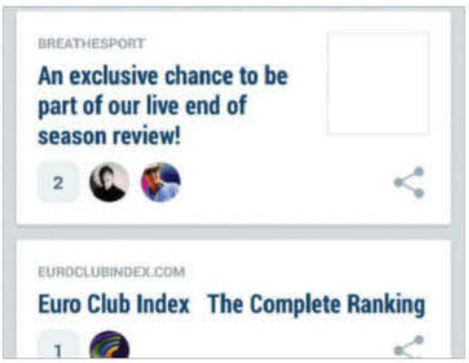
So, its like Flipboard? To an extent yes, but Nuzzel has much more streamlined interface for easy reading. This is also why its preferable for reading news stories in the app, rather than in the overwhelming social network itself.

Read on to find out how set up the app and get news updates from further afield with stories from friends of friends.



1 Set up the app

Download the app from the Google Play store and open it. It will give you the option to sign in with Twitter or Facebook. Tap the options and it will do so, provided you've got your log-in details saved. It won't post anything on your behalf.

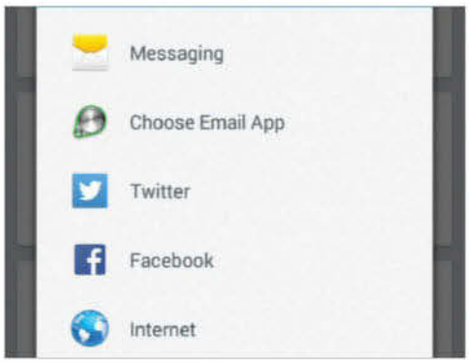


2 See your feed

Once you have signed in to Facebook, Twitter or both, Nuzzle will open up your news feed that is filled with stories shared by people that you follow or are friends with. There isn't an option to remove a story that you aren't interested in.

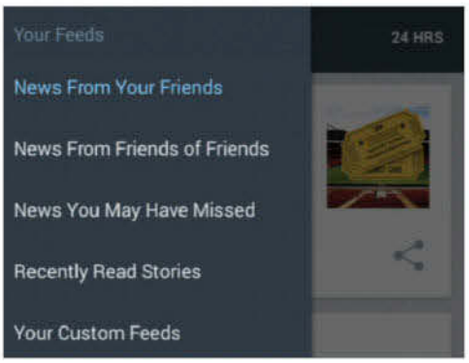
3 Activate text view

If a story is loading slowly, you can switch to a text-only version. In the top right-hand corner you'll see the word Text. Tap, and a basic version of the article will load. To return to the original version, tap the same spot that now says Web.



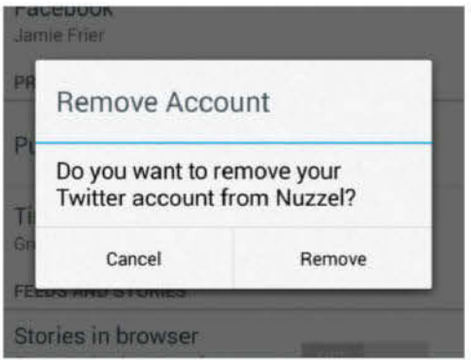
4 Share favourite stories

Nuzzel works on the principle of sharing. If you read a story and you think your friends or followers may find it interesting, click the Share button in the corner of the news feed. It will bring up sharing options, including Facebook and Twitter.



5 Search far and wide

Tap the hamburger menu in the top left and select 'News From Friends of Friends'. This opens up a feed of stories shared by secondary contacts. This menu also offers the chance to read the news feeds of your friends.



6 Remove an account

If you find that one of your accounts is showing news you don't want, press the top-left hamburger menu and click Settings. Tap on the account you want taken off and click Remove. This will stop news from that social media channel.

Apps used » Google Tone Chrome extension **Works with** » Chrome browser

Share URLs by sound with Google Tone

This experimental Chrome extension lets you broadcast a sound to nearby computers to share a link

Sharing a link to a webpage with a friend is as easy as copying and pasting a link into an email or IM message and hitting send. However, if that friend is sat right text to you, it just got even easier with Google Tone.

This Chrome extension lets you send a link to anyone within earshot with a single click. Just tap the megaphone icon at the top of your browser and your desktop will emit a burst of beeping sounds. Any other nearby computer with the extension will then receive a notification containing a link to the site your own machine is currently on.

The extension was developed in a day by Google's research team, but they decided to make available to everyone after they found it helpful tool for sharing links and Google Docs with everyone in a meeting quickly.

Crank the volume

If it didn't work, or just as a precautionary measure, try turning up the volume on your computer. However, Google Tone doesn't have a 100 per cent success rate: it may not work in loud spaces, over a distance, with a poor Internet connection, so beware

Send anything

If sending a URL sounds a bit pointless, consider how all encompassing this really is. It includes news stories, pictures, blog posts, products, YouTube videos, recipes – even documents saved to your Google Drive

Tap the megaphone

When you're ready to send, just tap the blue megaphone icon next to the address bar (or 'omnibox' if we're talking Google-ese). If it works, the megaphone should turn green and your machine will emit a pleasant chirping sound to confirm

Install the extension

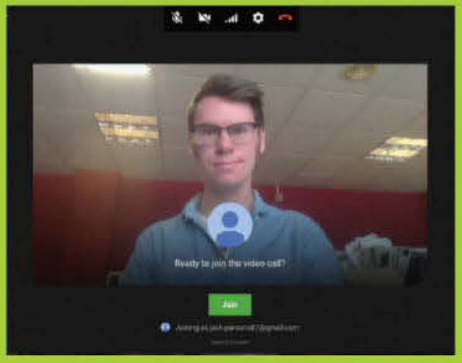
Google Tone is available for free from the Chrome Web Store. As it's an extension, it will only work through the desktop browser and not the mobile apps. The computer(s) your trying to send the link to must also have Tone installed for it to work

Check webpage

Google Tone will only share a link to the webpage that you are on, so make sure you're in the right tab before you use it – otherwise you might end up broadcasting something you would rather keep secret to everyone around you

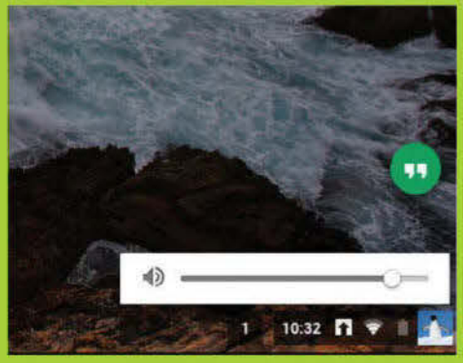
Send a Tone via Hangouts

Though Google Tone is intended to use with nearby computers, it will also work over a video call



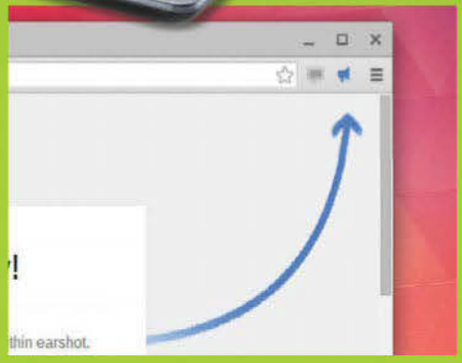
Hangout with friends

Start a video call. We did this through the Hangouts Chrome extension on our desktop, but you could do this with the app on your phone. It will work with other video call apps or a phone call.



Tap a tone

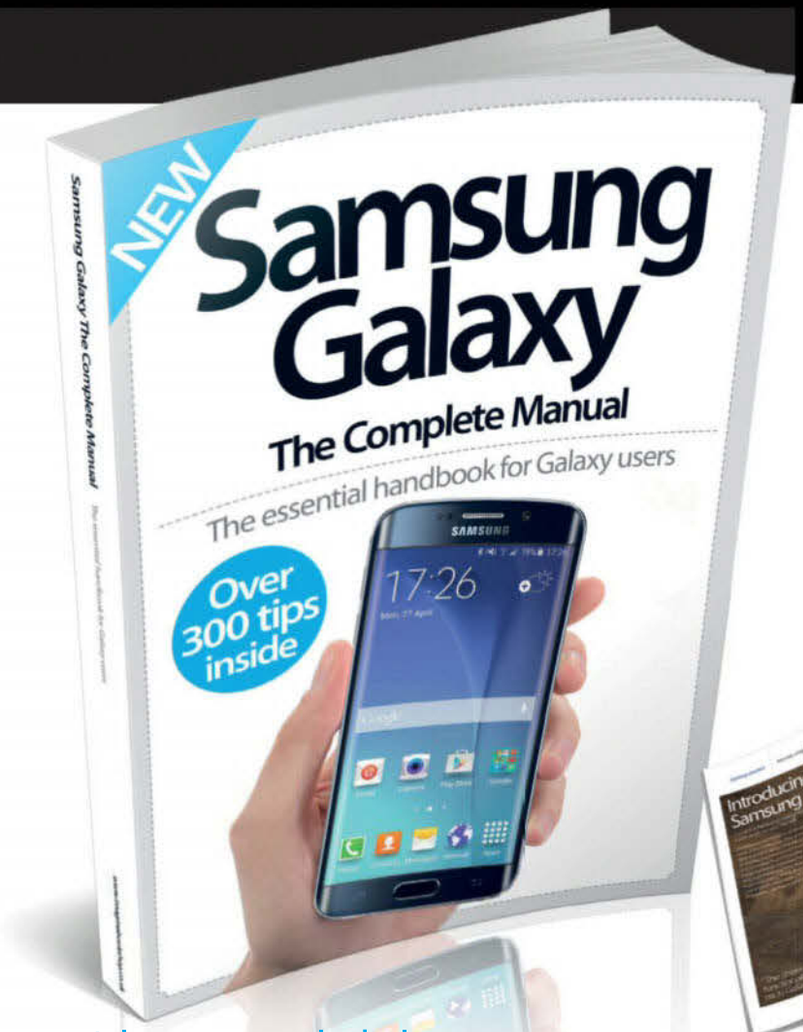
If both of you aren't talking via the Hangouts Chrome extension, ensure your friend has their laptop and microphone turned on. Turn your volume up and tap the megaphone to send your URL.



Hit and miss

In our tests we found that Google Tone worked 75 per cent of the time. If your own attempt didn't, ensure nobody was talking during the transmission and there weren't loud noises in the background.

From the makers of Android magazine

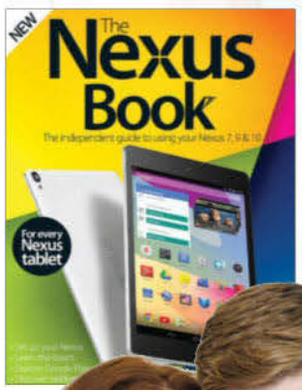


Samsung Galaxy

The Complete Manual

No matter what Galaxy device you have, this book will help you get the most from your phone or tablet. Packed with easy-to-follow guides to all the essential features, functions and apps, this is the perfect book to help you master your Galaxy.

Also available...



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Top mods and tweaks for your rooted device

Hacker Zone

Jargon Buster

Get up to speed on all the terms you will need to know when it comes to hacking your phone

OS
Short for 'operating system'. Often the Android ROM will be referred to as the OS – this just means the system files on the Android device that make up your user experience, and is similar to Windows, Mac OS X or Ubuntu on a desktop computer.

ROM
Stands for 'read-only memory'. In the context of Android, the ROM refers to all the files that make up the operating system that is installed on your device. Gaining root privileges allows for replacement of the standard ROM with a custom one.

Root
'Rooting' your phone gives apps access to parts of the OS that are normally hidden from consumers. This enables you to run more powerful software and install custom ROMs on your phone.

ROM Manager
An app available from the Android Market that enables you to install a whole new version of your OS with a single click. It requires a rooted phone to use and is ideal for those new on the scene.

Titanium Backup
This app from the Market enables you to back up everything on your phone – apps, data, settings and all. It means that you can restore your phone to how it was, even after you've updated or changed the ROM.

Unrevoked
Available from **unrevoked.com**, this is a one-click tool that can be used for rooting many popular HTC smartphones.

ADB
Stands for 'Android Debug Bridge'. ADB is mainly used for software development, but it also has some uses for hacking your phone. It can be used to push files onto the system folder, for instance.

Nandroid
You might come across the phrase 'perform a Nandroid backup'. This means using a custom recovery tool to make a backup image of everything currently on your phone: OS, apps, data, etc. It's very useful should you wish to restore your phone to its previous state later.

Radio
'Radio' refers to the software on your Android device that deals with making phone calls and data connections. Updating your radio version can bring better battery life and signal strength to your device. Some ROMs require the latest radio.

Flash
The storage in your device comprises flash memory, which is a type of solid-state storage. The terms 'flash' or 'flashing' mean installing some new software onto your device's storage.

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BECOME AN ANDROID PRO

Qualify as an developer in 12 months with Google's new Android Nanodegree

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Top tips to protect your display

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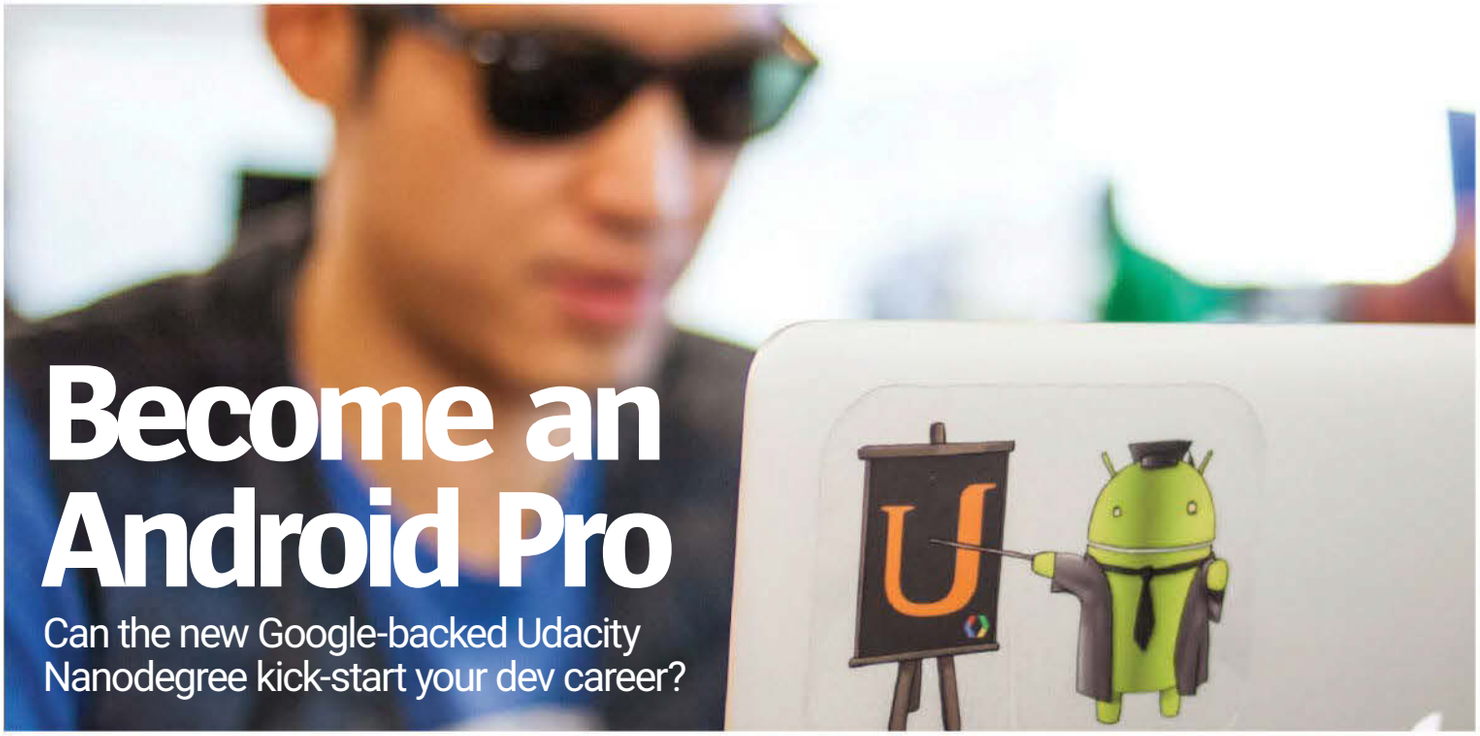


Become an Android Pro

Can the new Google-backed Udacity Nanodegree kick-start your dev career?

Google wants to make it faster and easier for the next-generation of hackers to become Android developers. It has partnered with the online education centre Udacity to produce an program that promises to help you "learn to develop for Android and transform your career outlook" over the course of 6-12 months.

Called the Android Nanodegree, the program offers free video content, along with the option of personal help, tuition and feedback for $200 a month. It's aimed at established or intermediate developers who want to jump to Android or improve their general skills. Tying together other Android learning programs into a structured whole, the new nanodegree is developed and taught by expert Google instructors, and covers everything from UX design to integration with Google Play services.

Google and Udacity are both keen to promote the new course and get students enrolled (you can sign up online at specific times throughout the year). In fact, Google is going to hand-pick 50 Android Nanodegree graduates to attend a hackathon in Mountain View in the near future. In Google's words, it's "an education credential that is designed for busy people to learn new skills and advance their careers in a short amount of time from anywhere at any time".

For those not familiar with it, Udacity began life in June 2011 as one of the first wave of companies offering Massive Open Online Courses (MOOCs), partnering with various education centres to bring free learning courses to anyone over the Web. The Android Nanodegree, produced in partnership with Google, epitomises the new direction Udacity is taking; bringing together existing coding courses to provide a quick and intense path to the top of the Android development tree.

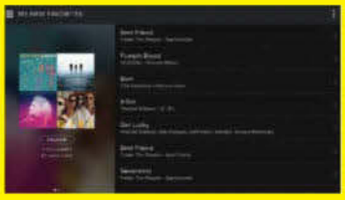
The subscription fee gives you access to tutors who review your code, offer guidance on your work, and answer your questions – plugging some of the gaps in a standard, free MOOC. According to Udacity, Google has invested $4 million and "thousands of hours" of developer time into the project. The course covers Android fundamentals, advanced development skills, integration with Google Play services, Material Design UI and more. Among the practical projects are a media player with Spotify compatibility and a joke-telling app that relies on Google's cloud services.

That 9-12 month estimate is based on committing ten hours a week, by the way – if you

What the Nanodegree covers

Google Play services

Learn how to integrate your apps with all of the Google Play services plug-ins that are available: analytics, AdMob, Maps, user identity and others. Each service is covered in a short standalone course, meaning you can master the techniques in a couple of weeks.



Build a Spotify streamer

Dealing with APIs is essential if you want your app to work with other programs and indeed Android itself. Building a media streamer on top of Spotify helps you acquire this knowledge by teaching you how to control music playback, and display the top artists for a particular user.

Master Material Design

To ensure your apps look their best, the Android nanodegree devotes around six weeks to studying Google's design guidelines. This includes approaches to the Material Design aesthetic, image handling within an app, performance profiling and more.

Create your own app

At the end of the nanodegree you get to work on one of your own ideas, from the original UI design and mock-ups to getting the app ready for publishing. You get feedback along the way and by the end of the process you're going to have an app ready to submit to Google Play.

can devote more time then you might finish sooner. At the end of the course you get a professionally recognised certification and, as we mentioned earlier, maybe even the chance to go and attend a few Google-sponsored workshops.

The expert view

To find out how MOOCs in general and the Android Nanodegree in particular are viewed by those outside the walls of Google and Udacity, we spoke to two academics working in more established educational institutions: Peter McKenna, principal lecturer and head of the undergraduate e-learning unit at Manchester Metropolitan University, and Peter Reed, lecturer in Technology Enhanced Learning at the University of Liverpool.

"Many MOOCs use fairly old techniques – lecture plus test, drill-and grill – via relatively new technologies," says McKenna. "On the plus side, the 'sage on the stage' can be paused and rewound, and the course is accessible to millions; on the negative side, there is less scope for individual communication. Personalised communication is not just troubleshooting and personal mentoring, it's part of a cyclical learning process that is intrinsic to deep understanding."

> "At the end you get a professionally recognised certification and maybe the chance to attend Google workshops"

The potential danger with MOOCs is that you get a one-size-fits-all approach, says McKenna. "Udacity's nanodegrees are narrower than traditional degrees, but will demand less of your time and your money. The best MOOCs provide learners with a scaffolded but realistic coding environment where they can interactively enter code and get debugging feedback. Authentic problem-based learning, however, is best experienced in a traditional face-to-face environment, where you can build actual apps for actual clients and develop soft skills that are often missing from online courses."

McKenna says courses like the Android Nanodegree are ideal for fitting studies around existing commitments, but you have to bring a lot of the motivation and discipline yourself.

Peter Reed, meanwhile, sees both advantages and disadvantages to the new nanodegree. "On the surface, this is an ideal opportunity for budding developers," he says. "After all, who better to teach Android development than Google? The partnership ensures the content and activities are directly relevant and up-to-date, so participants will build a useful portfolio. The course will also be progressive so activities and projects will increase in complexity over time."

There are plenty of factors to weigh up in your decision, however. "At this point it's still unclear as to how employers view this certificate," says Reed. "Of course, at $200 per month, they are cheaper than an undergraduate degree, but perhaps it's not a fair comparison."

The Udacity alumni

Since summer 2011, more than 1.6 million students have passed through Udacity's virtual doors. One of those is Dmitry Mina, a Ukrainian coder who switched from Web to Android development using the site's courses: Mina went through the system before the arrival of the Android Nanodegree, but used some of the other Android sessions to move into apps.

"Millions of people use smartphones, and it's our chance to influence the world through our code," he says of why he swapped Web coding for app coding. "Udacity provides mentorship and support. Also local group meetings were really helpful. The learning process is well organised.

"Just know that if you start, do not give it up!" he adds. "If you do not understand anything or something does not work, ask a mentor or a fellow student. This happens in real life as well. In the end you will be able to write a working app yourself and that is the biggest reward."

Today, Dmitry Mina works as an Android developer for Danish studio Ciklum, so he is living proof that a Udacity course can work.

We also spoke to Hayden Lee, originally a mechanical engineering student from the US who used Udacity courses to build up his Web coding skills from scratch. Having tried to build a "video-based Wikipedia" on his own for six months, he finally noticed Udacity and took three of the coding courses, gaining confidence along the way.

"The courses were amazing," he enthuses. "My favourite was the Web development course, taught by [Reddit founder] Steve Huffman. Having a young teacher made it particularly great, as Steve would often give real-world examples from his time at Reddit, which I loved. The most valuable learning resource was the real coding projects they made you do… at the end of the course I had a functioning website rather than some abstract project that I couldn't show anybody or use."

Although Lee focused on Web development at Udacity, he now works on a social virtual reality project called Convrge, which involves some Android coding. What advice would he give to prospective students of the Android Nanodegree? "Be prepared to go all in… set a goal and just do it. Spend time looking up extra Android lessons on YouTube and really get to know the latest happenings in Android development."

For more information and to sign up, head over to ***udacity.com***

Alternative online courses

Udacity's Nanodegree is not the only way to learn to code online

Codeacademy

» **Price** Free
» **Duration** 1-5 hours per course

Unlike the Android Nanodegree, Codeacademy (**codecademy.com**) starts with the basics and moves on from there. The lessons take the form of interactive exercises that run in your browser, and cover HTML, CSS, JavaScript, jQuery, Python, Ruby and PHP. It doesn't cover advanced programming but it's very accessible.

Code School

» **Price** $29 per month
» **Duration** Varies between courses

Code School (**codeschool.com**) has a "learn by doing" mantra and it isn't for beginners – like the Udacity Nanodegree, you're going to need some level of existing knowledge to be able to make sense of the course. There are many programming modules to choose from and some resources can be accessed for free.

Treehouse

» **Price** $25-49 per month
» **Duration** Around 45 hours in total for all courses

Of all the online education platforms featured here, Treehouse (**teamtreehouse.com**) is one of the most comprehensive. It offers students a vast array of different tracks and topics (including Android development), with strong community support, and you can choose a tailored route through to match your existing talents and your ultimate goals.

Coursera

» **Price** Free
» **Duration** Typically around four weeks

Coursera (**coursera.org**) partners with top universities from across the world and enables you to access different study options, including mobile development for Android. There's less interactivity than other portals, with lesson grading often done by computer algorithms or by your fellow students, for example.

edX

» **Price** Free
» **Duration** Varies between courses

A non-profit run by Harvard and MIT, edX (**edx.org**) follows the Coursera model of partnering with universities to provide courses, a number of which cover programming. The quality can be more hit and miss than it is on Udacity, but aside from some verified certificate fees the courses are free for students to follow.

status update

Which devices are best for the hacking scene?

ZTE Blade S6

Rooted? Yes
Active Development: Medium
The Blade S6 boasts great specs and a low price. But its MiFlavor UI is Marmite for many, so why not try hacking it and adding a new ROM?

LG G4

Rooted? Yes
Active Development: High
The LG G4 has not been availalbe for long, but it was quickly rooted. Unlock it now to try out new features, ROMs and apps.

Nexus 7

Rooted? Yes
Active Development: High
Google didn't release Android M for the Nexus 7, so check the XDA Forums for Xposed modules that imitate M features.

Moto 360

Rooted? Yes
Active Development: High
Motorola keep slashing the price of the Moto 360, so pick one up now it's cheap to experiment with smartwatch hacks.

Tips & Tricks

The forgotten art of wired tethering

What if you need to get online and don't have wireless access?

The answer is a USB cable connected between your Android phone and desktop computer. While it means making sure you have your phone's charger cable with you, USB offers the fastest tethered connection, and gives the most benefit from your 4G contract.

After connecting the devices, open Settings>Wireless & networks >More and find 'Tethering & portable hotspot', then check the USB tethering checkbox.

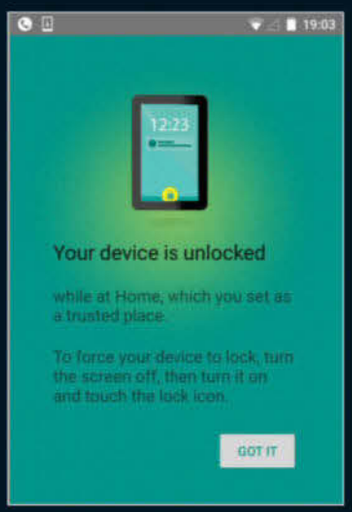
No Wi-Fi? Use USB to share your Internet connection with a PC or laptop

In the notification area, a symbol will indicate that the connection is active, and if successful, a similar icon will appear on your computer. If a USB cable isn't available, see our quick hacks box for help on Bluetooth tethering instead.

Unlock your phone with other devices

What if Android could conveniently unlock itself? This is possible with Lollipop's Smart Lock feature, found in Settings>Security.

This feature doesn't just let you use NFC and Bluetooth enabled devices to unlock your Android phone or tablet based on proximity. It is also designed to let you keep your phone unlocked if it can spot your face, your voice, and even by location, such as your home, for example.



Use an NFC tag to unlock your phone

As soon as the phone changes its physical state or location, the lock activates. This is a particularly useful feature, especially for things like Bluetooth car stereos. Rather than unlock your phone before loading up Tunein Radio, as soon as the Bluetooth connection is established, your favourite station will be ready to play!

Resist Hangouts for SMS

Google Hangouts is the default option for SMS messages on Android Lollipop, but this isn't necessarily convenient for many. After all, there was nothing wrong with the old native SMS reading and sending app, was there? While you can see why Google would want to tie Hangouts messaging with SMS messaging (to keep native messaging tidy and accessible via a single app), a great deal of users don't even use Hangouts, making the app around 50 per cent useless.

Fortunately there is a solution as you can switch to an alternative SMS app with ease. Begin by installing a new SMS app. In Android 4.1 KitKat, you should already have the old default SMS app, so open Settings, then SMS and switch the Default SMS app to this.

quickhacks

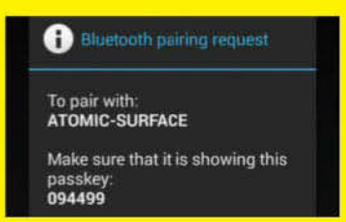
Bluetooth tethering for kaptops without using Wi-Fi

Ever needed to get an old laptop online but unable to get Wi-Fi working? While USB tethering is an option there is another alternative – Bluetooth tethering.

Although a Bluetooth dongle may be needed, you should still be able to get connected.

1 Activate Bluetooth

On Android activate the Bluetooth – ensure you have a mobile internet connection. On your computer find the Bluetooth icon in the system tray, right-click, select Open Settings and check Discovery.

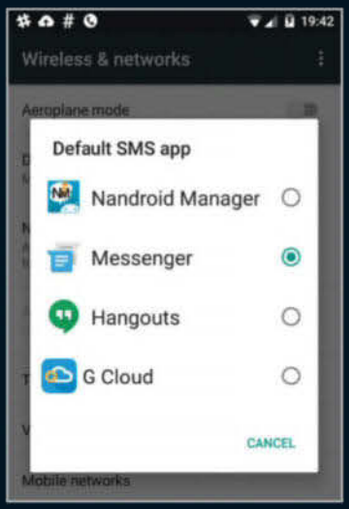


2 Pair your Android and PC

You should now see the name of your computer. Tap it and pair your devices, confirming the security code matches. In Settings>More> Tethering & portable hotspot, activate Bluetooth tethering.

3 Get online with Bluetooth

Open Control Panel>Hardware and Sound>Devices and Printers. Right-click the phone's icon and select Connect using>Access point. You'll now be online.



Hangouts really isn't ideal for sending and receiving SMS messages.

In Android 5.0 Lollipop, it's a little more complicated as the old SMS app is not present. Instead, check Google Play for an alternative and install this. Open Settings>More> SMS and under Default SMS app, select Messenger (or whatever SMS app you have installed).

You might also want to remove the Hangouts icon from the apps dock and then replace it with the replacement SMS app.

Don't overlook Google Settings

We regularly discuss tweaks and tips on these pages but the Google settings in Android, accessed via the app drawer, are often overlooked.

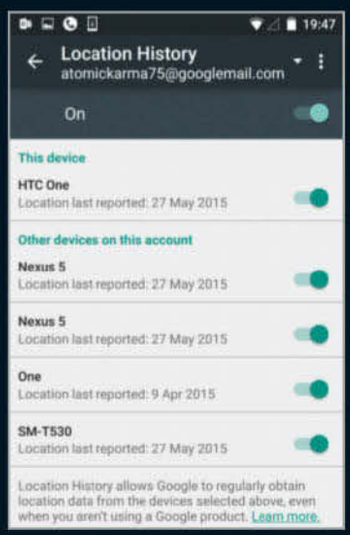
Google has packed a lot into this screen, so if you're using a Google-flavoured ROM (as opposed to one adhering to AOSP) you'll find a few security-related settings in here that you might like to adjust. For example, you'll find your Account History, where the activity of any Google accounts currently setup on your phone can be toggled and tweaked. You'll find Web & App Activity, where any previous searches on other devices using Chrome are factored in for faster search results. Alongside this, you'll find settings for your YouTube activity and even your Location History.

If you have any concerns about privacy and security, you should disable this option and use the Delete Location History button to discard any information collected to date.

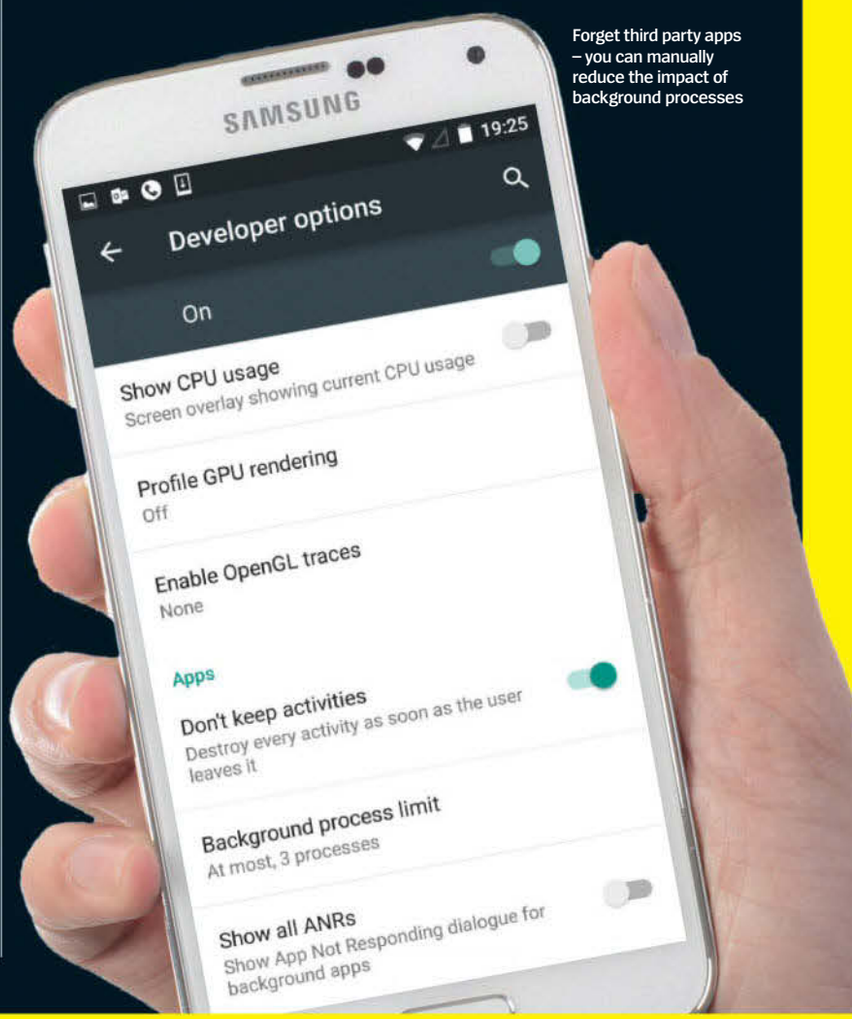
Limit background processes

Concerned about battery life? Of course you are. While Lollipop comes with its own battery limiting tool (Settings>Battery>Battery saver) other options are present that will reduce battery drain. We're not talking managing display brightness or vibrating key presses here, either. Manual limits can be applied to Android's background processes, enabling you to reduce the impact apps running in the background have on your battery.

Begin by opening Settings> Developer options (you can enable this in Settings>About phone and tapping Build number repeatedly) and enabling the 'Don't keep activities' setting, which will kill any app you stop using. If this feels too much of a nuclear option, then just use the next settings – 'Background process limit' – which you can use to disable background processes entirely or limit those that are running up to four.

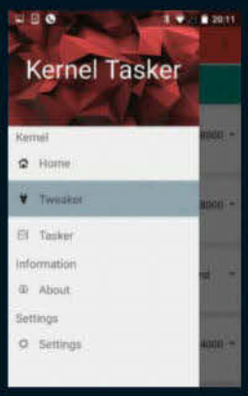


It is good to know where your privacy settings are in Android Lollipop



Forget third party apps – you can manually reduce the impact of background processes

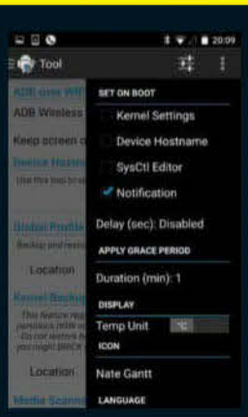
Hacking the easy way
Get great new features without getting your hands (too) dirty



Kernel Tasker (Root)

Price: Free
From: Google Play
Need root? Yes

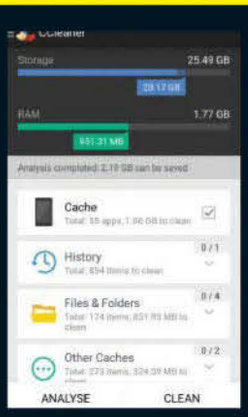
Overclocking your Android can improve performance, but you don't need it for some apps. Kernel Tasker will boost custom kernel settings when certain parameters are met which will improve the battery and speed.



Trickster MOD Kernel Settings

Price: Free (paid version £1.72/$2.92)
From: Google Play
Need root? Yes

Custom kernel users need a good kernel management app to adjust clock speed, CPU governor, MPU voltage and more. Use this app to get your fingers dirty and start tweaking.



CCleaner

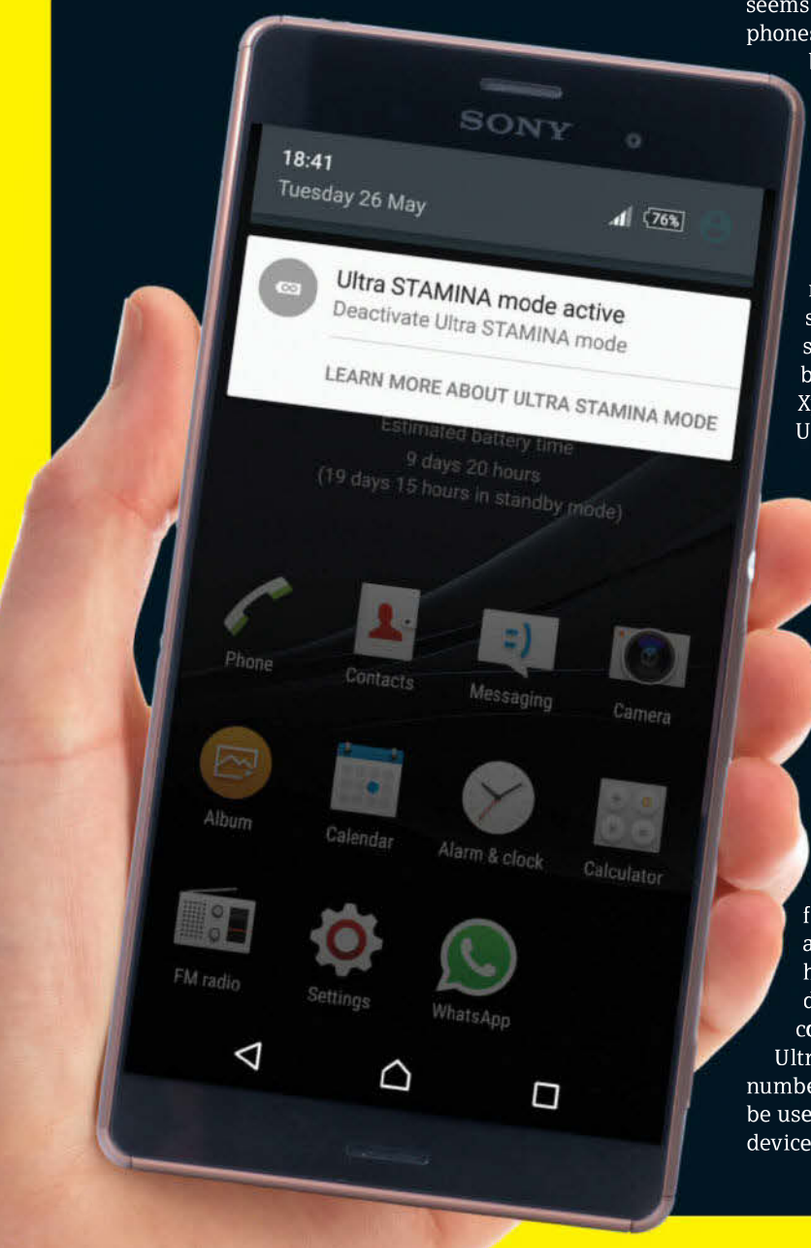
Price: Free
From: Google Play
Need root? No

The world's most popular cleaning app for Windows and Mac OS X is now on Android. It is designed to safely remove junk, reclaim your space and monitor system performance while you use your phone. It's worth downloading.

Works with » Android 5.0 **Difficulty** » Intermediate

Customise Ultra Stamina mode

Tailor your Sony Xperia's battery-boosting mode to your needs

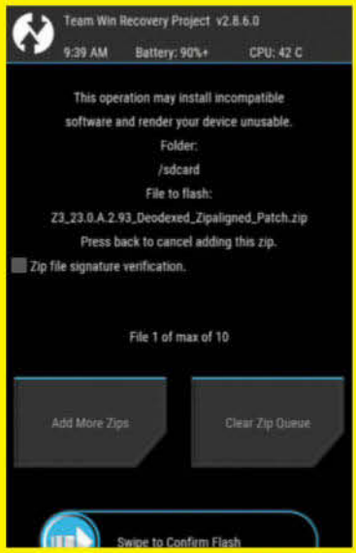


One of the best features of the Sony Xperia range of devices is the excellent battery life. Where other manufacturers often struggle, Sony seems to have it figured out – its phones and tablets not only have batteries that are often bigger than the competitors, but Sony has also done a great job at making its software particularly efficient.

As well as the built-in Stamina features, which allow the device to intelligently manage its activity when the screen is turned off – something that really makes a big difference in Android – Xperia devices also include Ultra Stamina mode.

Ultra Stamina mode is ideal for when your battery is running low and you know it's going to be a while before you can get to a charger. It limits the activity on your device to a few core features such as phone, messaging and a few offline apps, while also disabling mobile data and Wi-Fi connectivity.

This is great if you are in a tight spot, but what if you want the extended battery life in addition to more functionality than phoning and texting? This is where the hack from XDA Forum developer androidexpert35 comes in – it takes the core of Ultra Stamina mode and adds a number of useful features that can be used without draining your device's battery life.

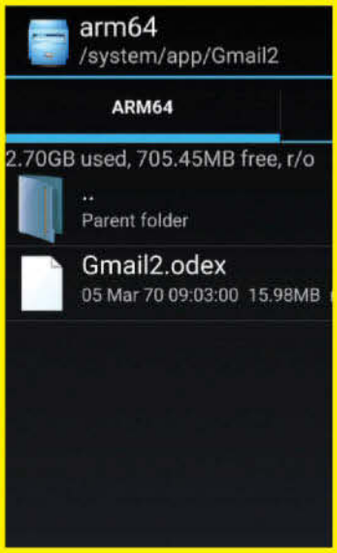


1 Use a deodexed ROM

Normally ROMs are odexed, which means that there is what amounts to an integrity check on the core files and if those (framework) files are modified, the device won't boot. For that reason you will need to flash a deodexed stock or a custom ROM – found at the XDA forums.

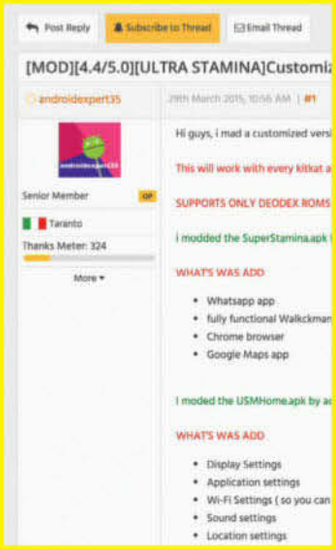
6 Use the new Stamina launcher

The altered SuperStamina.apk file in the modification provides an updated launcher, which adds a link to the WhatsApp application, Walkman app, Chrome Browser and Google Maps apps – all changes that greatly improve the experience in Ultra Stamina mode.



2 Check if ROM is addicted

You can easily check whether your current ROM is odexed by looking in the /system/app directory using a file explorer. If you only see the APK in app directories, your ROM is *not* odexed. If you see .dex or .oat files, your ROM *is* odexed and you will need to flash another.



3 Download the mod

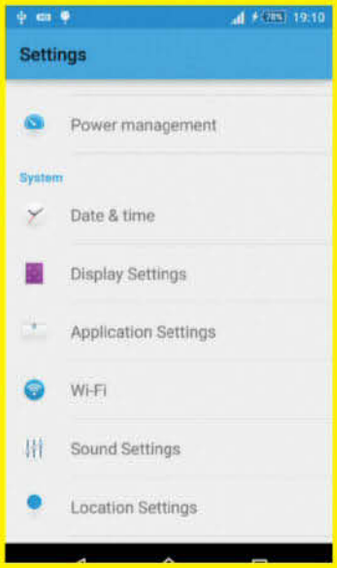
After you have flashed a custom recovery and a deodexed ROM, you can download the modification from **goo.gl/JOIkN1**. Note that there are two different links depending on if you're using a KitKat or Lollipop ROM on your device – it's important to use the right variant.

4 Flash using TWRP

After downloading, you need to place the zip on an SD card or push the file to your device using ADB. You can then reboot to recovery using 'adb reboot recovery' or an app like Quick Boot from the Play store. Use the menus to navigate to install the ZIP – after backing up!

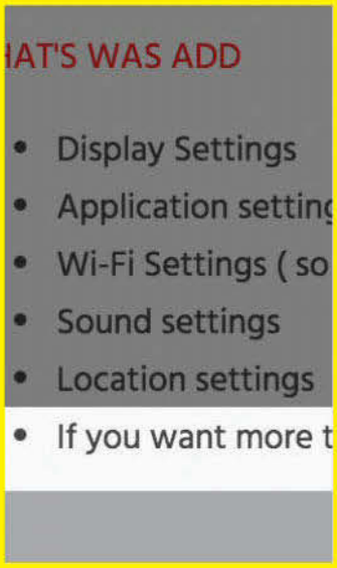
5 Wipe the dalvik-cache

You will need to wipe the dalvik-cache on your device before rebooting – this will ensure that the new, modified code is picked up by the system on boot. From the wipe menu in TWRP, select the 'dalvik-cache' option (with care!) and you will be ready to go.



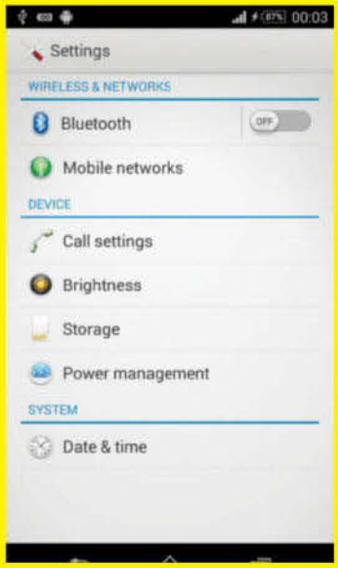
7 Customise the new settings

The modified USMHome.apk file lets you access settings features that couldn't be changed before. This includes access to display, application, Wi-Fi, sound and location settings – this gives you granular control. Features like Wi-Fi will lower battery life, however.



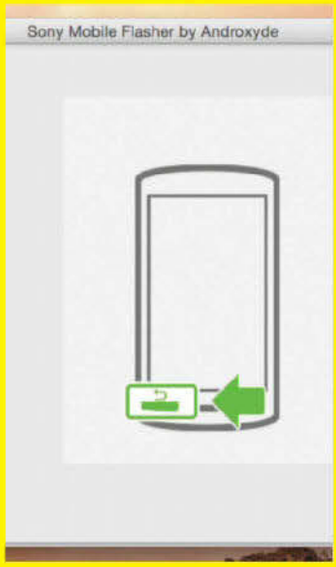
8 Request new features

The Ultra Stamina mode modification has been created by androidexpert35, who still frequents the XDA forums. He invites users to suggest new features and when people have done so, he has added them. So if you have an idea, go and share it.



9 Restore stock settings

When you downloaded the modification ZIP installer, you also downloaded a restore tool called USM_Restorer.zip. This will revert the files that have been changed, restoring stock functionality. This is flashed in the same way as the installer, using TWRP.



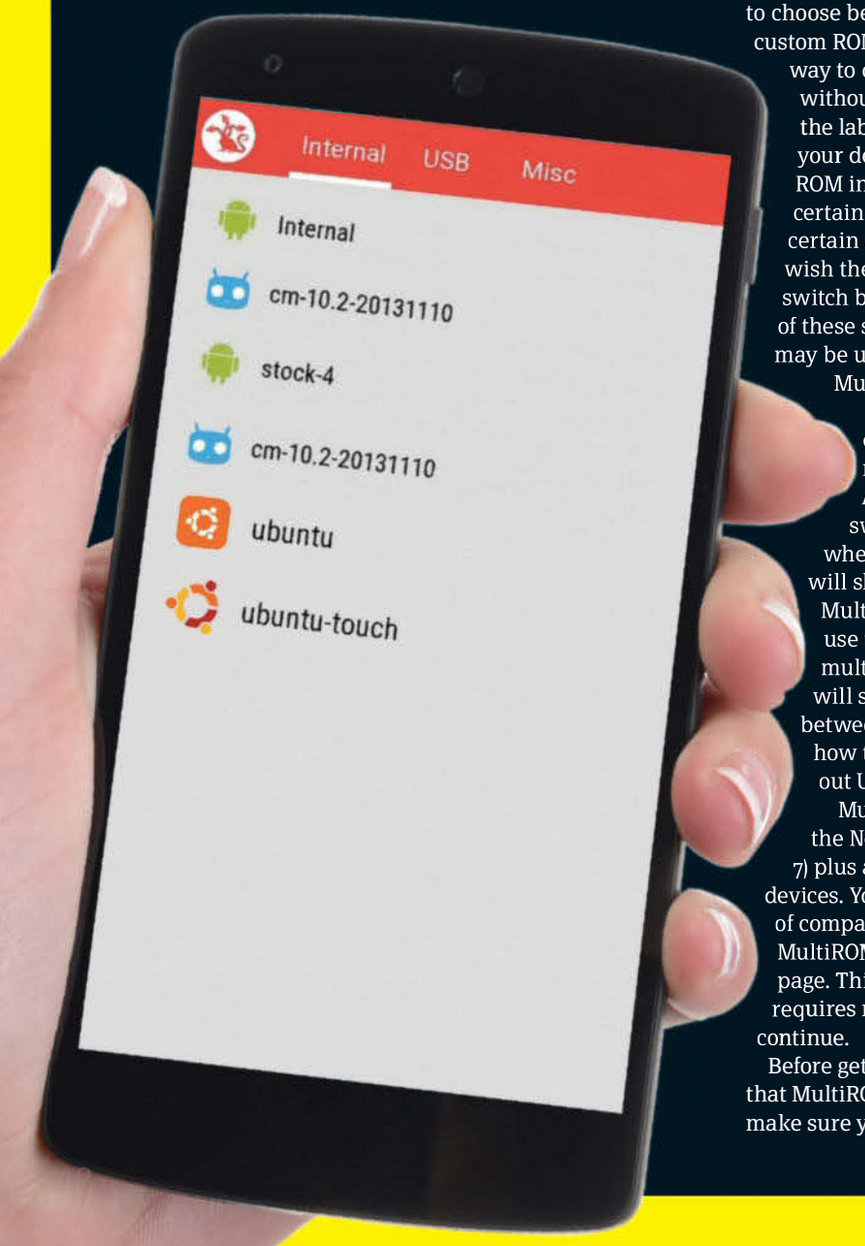
10 Reflashing your ROM

If you want to return your device to a stock state, including the recovery image, you should use the Flashtool to flash the stock FTF file. The correct FTF for your device can be downloaded using the XperiFirm tool, which downloads directly from Sony's servers for peace of mind.

Works with » Android 4.1 and up **Difficulty** » Intermediate

Install multiple ROMs on your device

Struggling to choose between ROMs? You can learn how to dual boot your device

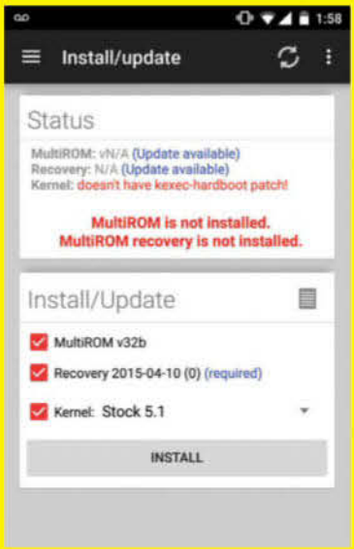


The great thing about Android is that there are so many possibilities for customising your device, but sometimes too much choice can be a bad thing! Maybe you're struggling to choose between a handful of custom ROMs, and wish there was a way to quickly test them all out without having to go through the laborious process of wiping your device and flashing each ROM in turn. Or maybe you like certain aspects of one ROM and certain aspects of another, and wish there was a way to easily switch between them. If either of these sound like you, then it may be useful for you to give MultiROM a try.

This multi-boot mod enables you to install multiple ROMs on a single Android device, and then switch between them whenever your app boots. We will show you how to install MultiROM and then how to use this app to install multiple ROMs. Finally, you will see how to switch between these ROMs and then how to use MultiROM to test out Ubuntu Touch.

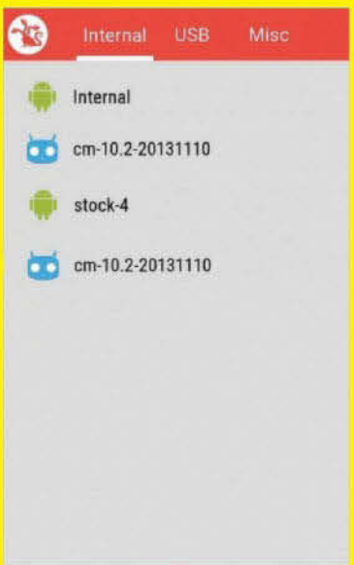
MultiROM works with all the Nexus devices (4, 5, 6 and 7) plus a handful of other devices. You'll find a complete list of compatible devices over at MultiROM Manager's Google Play page. This customisation also requires root access before you continue.

Before getting started, be aware that MultiROM does carry a risk, so make sure you create a full backup.



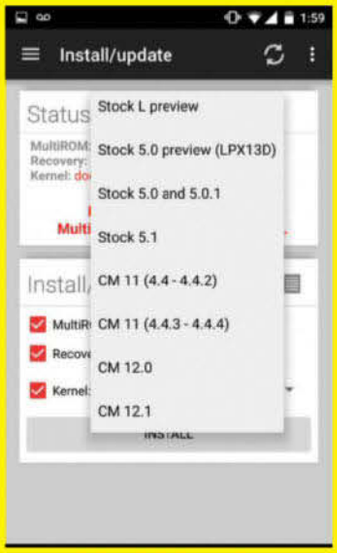
1 Download MultiROM Manager

Download MultiROM Manager from the Google Play store. Launch the app and make sure it has super user access. In the app's Status section you may see a 'doesn't have kexec-hardboot patch' message. If you see this warning, it means you need to install a patched kernel.



6 Select new ROM

To see all the ROMs that are installed on your device, tap the Internal tab. Then simply double-tap the ROM that you want to boot into and your device will boot into the selected ROM. You can switch ROMs at any point, by booting into your custom recovery and repeating the previous few steps.

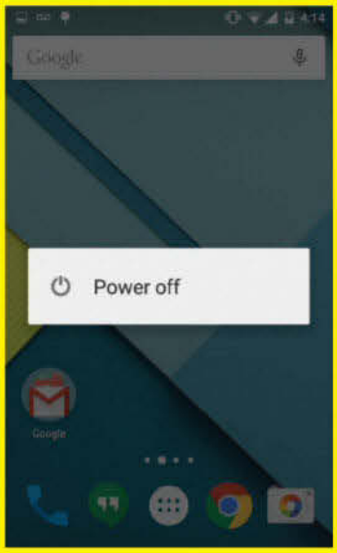


2 Choose a kernel

To install a kernel, tap the Kernel text in the card below and select one of the kernels from the dropdown menu. Note, you're choosing a kernel for your current ROM – not any of the ROMs you install subsequently via MultiROM, so choose something appropriate for your current ROM.

3 Install MultiROM

To install MultiROM, tap the Install button and wait while your device installs all the required files. When prompted, tap Reboot followed by Boot Now. Once your device has rebooted, attach it to your computer via USB and copy all the ROMs you want to install onto your Android device.

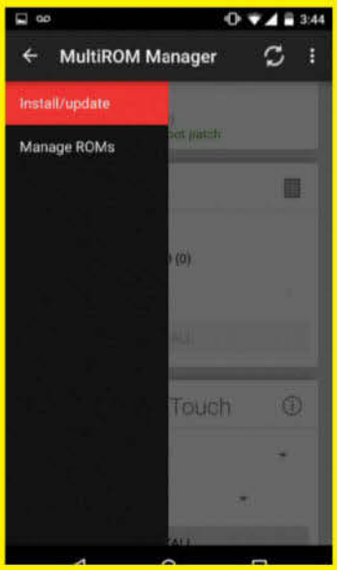


4 Boot into recovery

Boot into your new MultiROM TWRP recovery. To add new ROMs to MultiROM, tap Advanced followed by MultiROM and Add ROM. Select Android then tap Next and tap ZIP file. Navigate to the ROM you want to install and give it a tap. Swipe to confirm the installation.

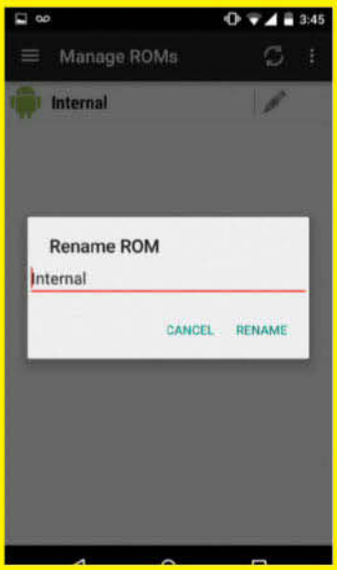
5 Beat the timer

Keep tapping the Back button until you get to the first screen. Tap Reboot and then select System. During the boot process, a popup will appear on screen. If you want to access any ROM besides your primary ROM, tap Cancel before the four second timer runs out of time.



7 Boot via MultiROM

If the ROM you want to boot into is already installed on your device, you can switch ROMs via the MultiROM app. Launch MultiROM and tap the lined icon in its upper-left corner. Select Manage ROMs. You'll see a list of all the ROMs currently installed on your device.

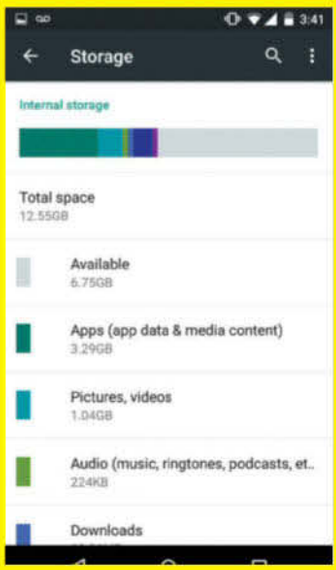


8 Rename your ROMs

To boot into any ROM on this list, simply give it a tap and then select Boot. On this screen you can also rename any of the ROMs installed on your device. Tap their accompanying pencil icon, then enter the new name and tap Rename to confirm.

9 Try Ubuntu Touch

You can also use MultiROM to install the Ubuntu Touch ROM. This ROM is a mobile version of the popular Ubuntu operating system. To install Ubuntu Touch, launch the MultiROM app and scroll to the 'Install Ubuntu Touch' section. Tap Install and then follow the instructions on the screen.



10 Free up space

If you're struggling for space, at some point you may want to delete some of the ROMs installed on your device. To do this, boot into recovery, then tap Advanced, followed by MultiROM and List ROMs. Select the ROM you want to delete, then press Delete and confirm the deletion.

Works with Android 5.0 **Difficulty Level** Easy

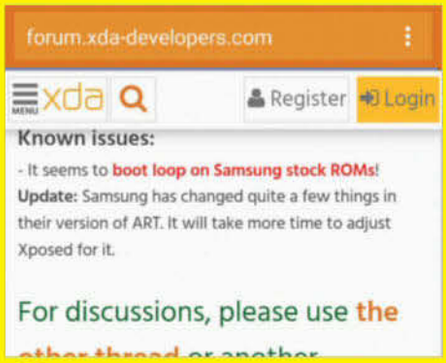
Send larger email attachments via Gmail

Lift Gmail's 5MB limit on email attachments with the Xposed framework

Despite its name, you can use Android's Gmail app to send and receive emails through non-Gmail addresses. There is one catch though – if you use a third party email provider, Gmail puts a 5MB limit on the size of your email attachments.

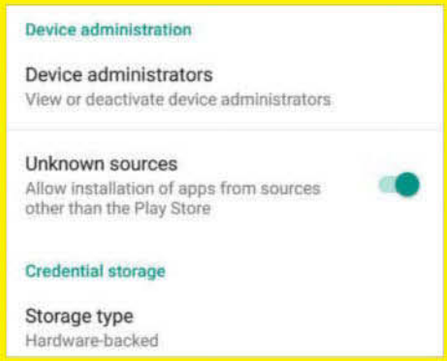
Typically this meant that if you wanted to send non-Gmail emails with attachments, you had to download an additional email app. However, if you don't fancy juggling multiple email apps, there is an Xposed module that lifts the 5MB limit.

We will show you how to install the Xposed framework and the necessary GMail module. To start, you will need a rooted device with Gmail 5.1 installed. Although this tutorial shows you how to install the Xposed framework on Lollipop, you can do it on earlier versions of Android – you'll just need to install an earlier version of the Xposed framework.



1 Install Xposed framework

Go to **http://goo.gl/TWSWpv** and download the xposed-arm and Xposed Installer files. Boot into the custom recovery, then flash xposed-arm by selecting 'Install from SD card', going to Downloads and tapping the xposed-arm file.

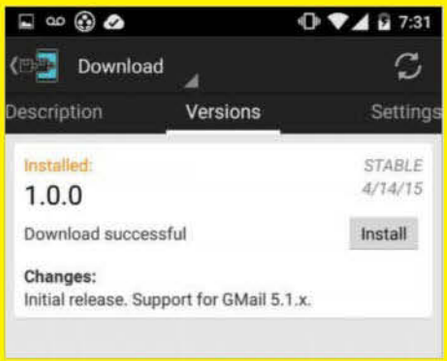


2 Enable Unknown sources

Reboot and check you can install apps from sources other than Google Play by launching your Settings and selecting Security. Ensure Unknown sources is set to 'on'. Next, use a File Explorer app to go to your Downloads folder.

3 Search for module

Find your XposedInstaller file and tap it, then follow the instructions to install. Open your app drawer and launch the Xposed Installer. Tap Download, then the magnifying glass icon and start to type 'GMail App Attachment Size'. When the GMail module appears, tap it.

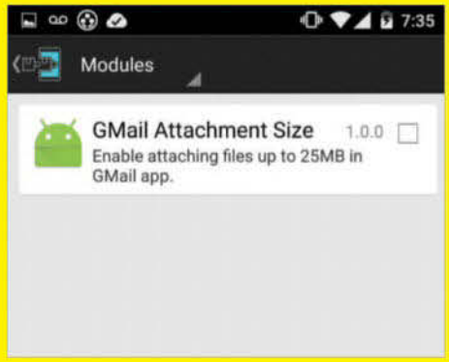


4 Download module

Read the onscreen information, then right-swipe to the Versions tab. Tap Download and when prompted, tap Install. Once installed, tap the Download button in the toolbar to open a dropdown menu. Select Modules and then the 'GMail Attachment Size' checkbox.

5 Reboot your device

In the toolbar, tap the Modules button and select Framework from the dropdown menu. Give the Reboot button a tap and your device will reboot with the module already active. Test it's working by launching your Gmail app and trying to send a large attachment.



6 Deactivate module

If you want to deactivate the module for any reason, launch the Xposed Installer and tap Module in the toolbar. Tap to deselect the GMail module. You'll need to reboot for it to take effect, so tap Modules in the toolbar and select Framework. Then tap Reboot.

Works with » Android 5.0 **Difficulty Level** Easy

Get ChomePie for Android Lollipop

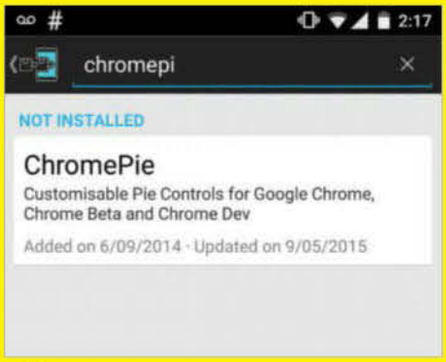
Add the popular pie menu to Chrome for Android 5.0 for custom controls

Smartphones and tablets are improving all the time, but the small screens and keyboards means that browsing the internet on your Android device isn't always easy, particularly when compared to traditional desktop computers.

ChromePie is an Xposed module that can make browsing in the Chrome app easier by adding swipe controls. Instead of navigating Chrome's menus and toolbar, swipe on the screen and out pops a ChromePie menu that you can customise with your own personalised shortcuts.

We will show you how to get ChromePie on Lollipop. The catch is that Xposed for Lollipop is only compatible with Android 5.0, so if you're running a higher version you'll need to downgrade.

If you haven't already, you can grab Xposed for Lollipop from the XDA Developers forum from the following link: **http://goo.gl/wS8x9F**



1 Download ChromePie

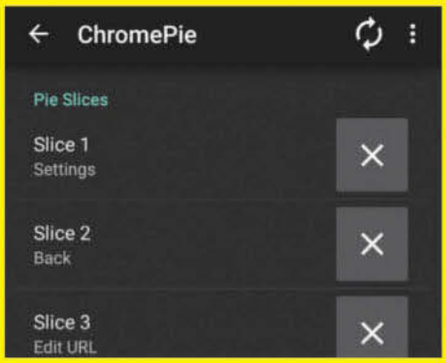
Open Xposed Installer and tap Download. Tap the magnifying glass icon and search for ChromePie. When the module appears, tap it. Read the information, tap Versions and download the most recent. Once downloaded, relaunch Xposed Installer and tap Modules.

2 Try your new ChromePie

Tap the checkbox to enable ChromePie and reboot your device. Once rebooted, launch Google Chrome and side-swipe from your screen – your new ChromePie menu should appear. The default slices are shortcuts to: Settings, Back, Edit URL, Show tabs and Bookmarks.

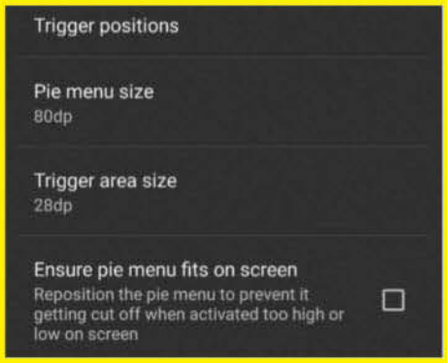
3 Select a slice

Once ChromePie is open, you can select any of the shortcuts by dragging your finger onto that slice of ChromePie. When it turns orange, release your finger and ChromePie performs the action. ChromePie is also customisable, so open your app drawer and tap the ChromePie app.



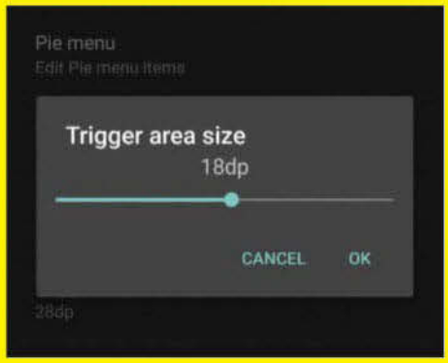
4 Edit your shortcuts

You can change the shortcut that appears in each slice by tapping Pie menu. Select the slice you want to change, tap 'Pie Item 1' and choose a new action from the popup. Also in the Pie menu, you can increase the number of slices by tapping 'Add new slice.'



5 Change trigger positions

You trigger ChromePie by dragging from the right, left or bottom of the screen. You can turn these positions on and off by going to the main ChromePie screen, tapping Trigger positions and toggling the Left, Right and Bottom options.



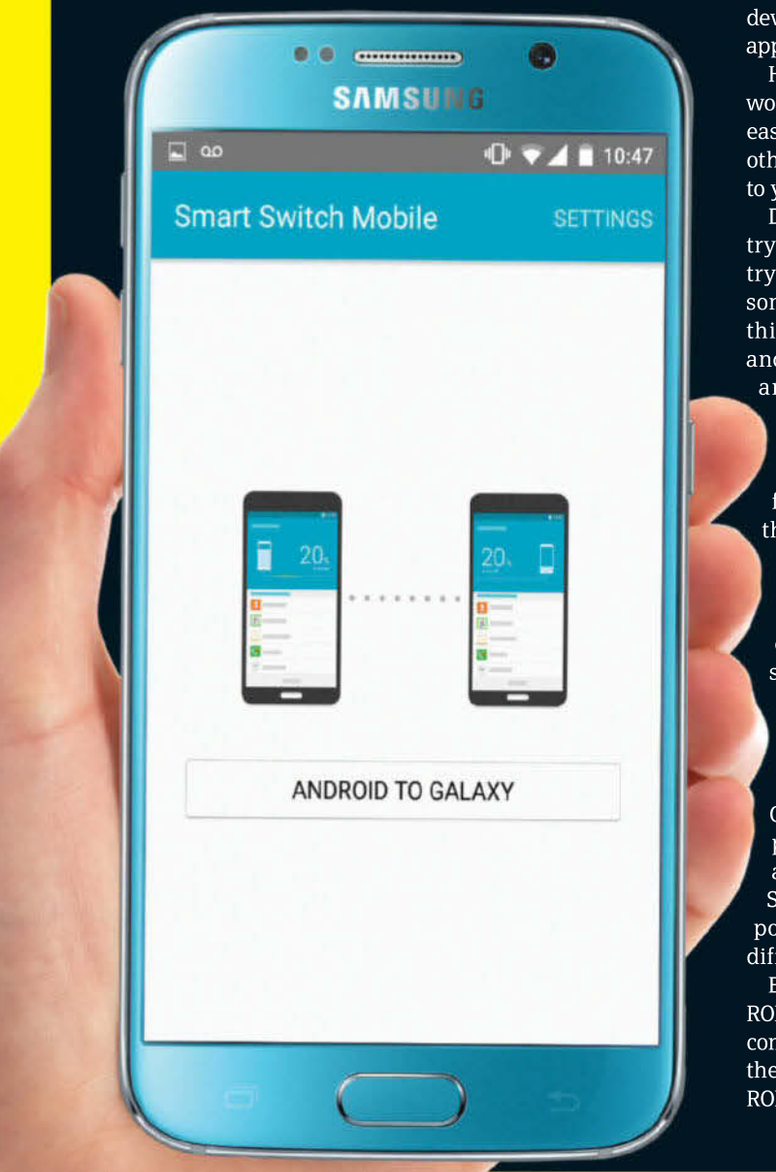
6 Trigger the area size

If you're struggling to launch ChromePie or are launching it by accident, you may want to change the 'Trigger area size'. Select this option from the main ChromePie screen and drag the slider. Whatever customisations you make, you'll need to tap Restart Chrome before they work.

Works with » Any version of Android **Difficulty** » Advanced

Port apps to unsupported ROMs

Run vendor-specific apps on any device by porting both the APK file and the libraries



Android may be an open platform, but that doesn't mean that every Android app will work on your device. Some manufacturers sneakily create apps that only work on their devices, like vendor-specific camera apps, for example.

Here, we will show you a useful workaround that you can use to easily port vendor-specific apps to other ROMS, before flashing the ROM to your own Android device.

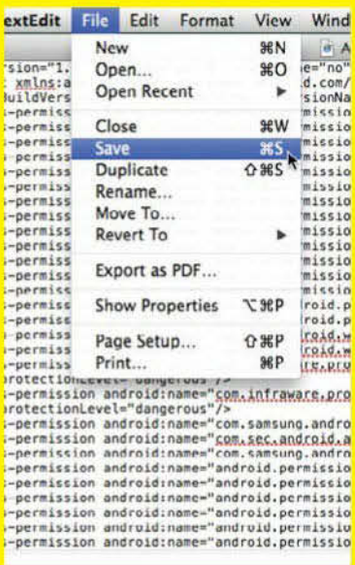
Depending on the app you're trying to port and the ROM you're trying to port to, you may encounter some differences. Some common things to look out for are folders and files that are laid out differently and apps that require additional dependencies. When you're examining your app's manifest it is always a good idea to look for any additional dependencies that this particular app may require, just in case.

Due to every app and ROM being slightly different, you'll experience varying levels of success with your ports. Generally, the less dramatic the port, the higher the chances of it working. For example, trying to port a Samsung Galaxy app to a HTC One is going to be trickier than porting to a Nexus device running an unmodified version of Android. So if you are struggling with your port it may be worth considering a different ROM to try.

Before you start, you'll need two ROMs downloaded onto your computer – the ROM that contains the app you want to port and the ROM you want to flash to your device.

1 Setup Apktool

Go to **http://goo.gl/5vVCKx** and download the latest version of Apktool, plus the relevant helper script for your operating system. Follow the instructions to install. Then create an apktools folder in your home directory and move both the apktool.jar and helper script into this folder to use later.



6 Check manifest's minSdkVersion

Check the Manifest's 'minSdkVersion' to make sure it's compatible with the version of Android you're flashing as part of your ROM. This value is the minimum version of the Android API this application requires to run. If necessary, you can change this value and save the edited Manifest file.

2 Extract your APKs

Navigate to the ROM containing the app you want to port. Unzip the ROM and find the app's APK. Move this APK to the apktools folder that you just created. You may also need the ROM's 'framework-res.apk', so find this file and move it to your apktools folder as well.

3 Add framework-res.apk

Open your Mac's terminal and change directory (cd) so it's pointing at your apktools folder. Your command should look like: **cd /Users/username/apktools**. Next, you'll need to install the device's framework, so issue the following: **./apktool if framework-res.apk**.

4 Open Android Manifest.xml

Decompile your APK using the **./apktool d** command, followed by the name of your APK. If the APK decompiles successfully, a new folder will appear in your apktools folder. Open this folder and find the app's Manifest.xml file. Open this file in a text editor.

5 Locate any libraries

Check if your app needs any libraries by searching the manifest for uses-library. If your app does, open the APK's lib/armeabi folder. This should contain the necessary library file. Store this file somewhere safe, as you'll need to add it to your ROM before flashing.

7 Compile your APK

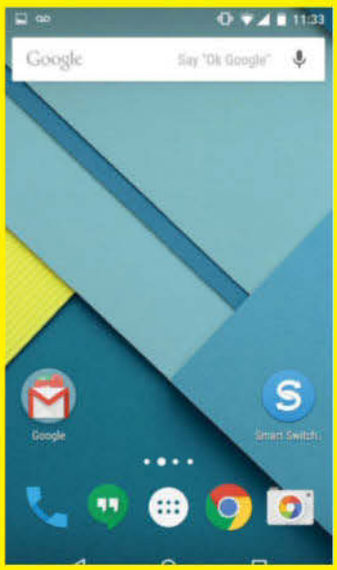
Compile your APK using the **./apktool b** command, followed by your decompiled APK, for example: **./apktool b sonyApp**. You'll get a newly-compiled APK, but before this can run on a device you'll need to sign it. Download SignApk (**bit.ly/1xeEWtn**) and unzip.

8 Sign your APK

Move your newly-compiled APK into the SignApk folder. Change directory so terminal is pointing at this folder, then run: **java -jar signapk.jar certificate.pem key.pk8** followed by the name of your newly-compiled APK and the name of the signed APK you want to create.

9 Modify your ROM

Now it is time to turn your attention to the ROM that you want to flash. Unzip this ROM and add your APK to its system/app folder. Next, open the system/lib folder and add any library files that the APK requires. Then finally, zip and copy the ROM to your chosen Android device.



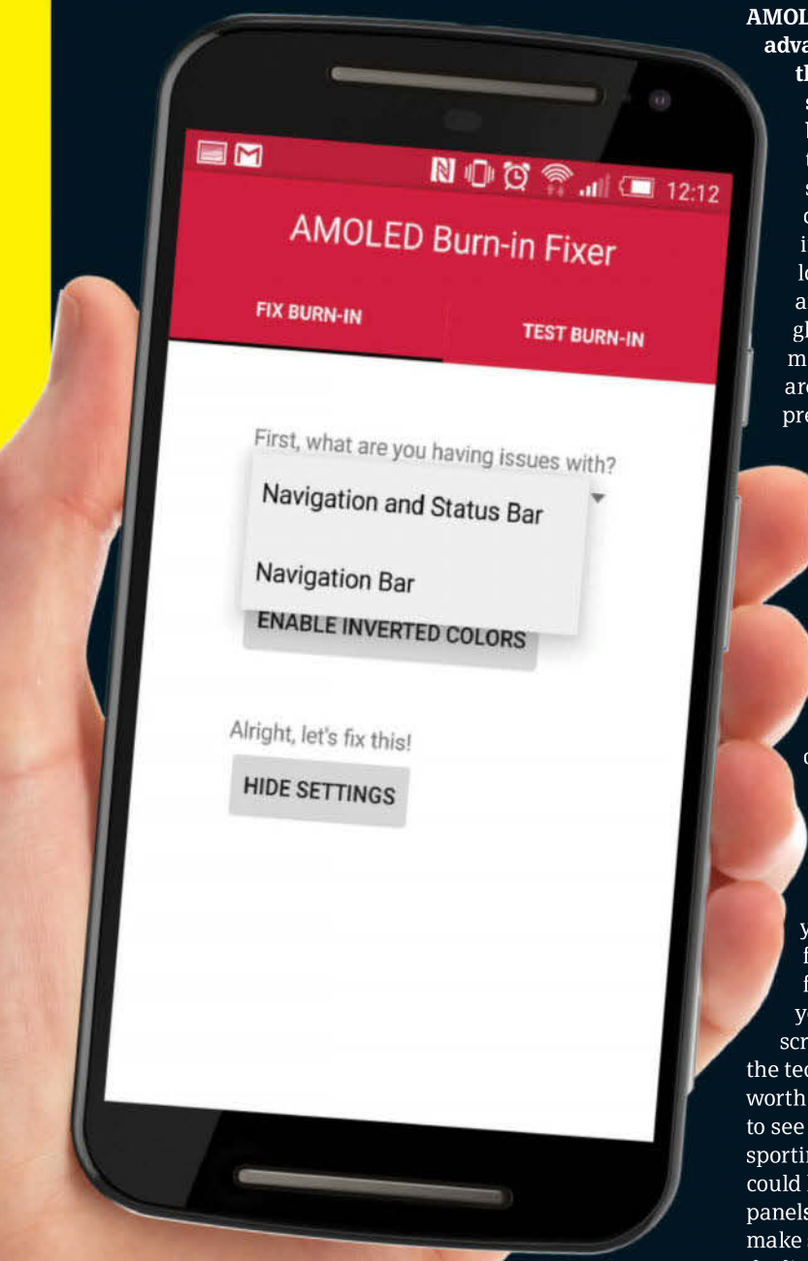
10 Flash your ROM

As always, make sure your device is fully backed up before attempting to flash a custom ROM. Boot into your device's recovery and follow the onscreen instructions to flash your custom ROM. Once it's finished, reboot your device and check whether your ported app is working correctly.

Works with » Android 5.0 **Difficulty** » Advanced

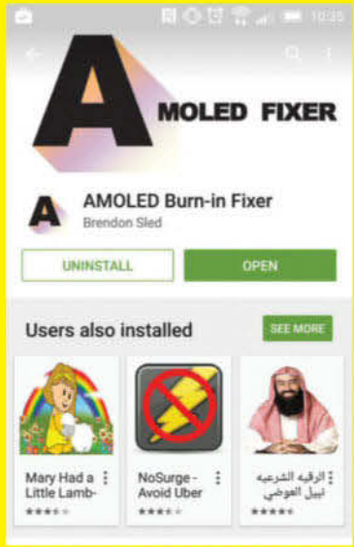
Protect your AMOLED screen

Simple tricks to make sure you are not ruining your phone's display



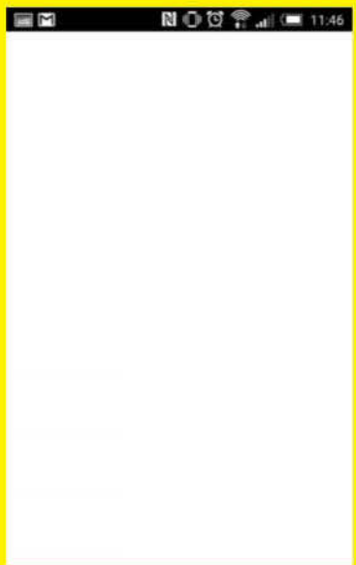
AMOLED screens offer a lot of advantages over LCD screens, but they're not without their setbacks – namely screen burn-in. This is a phenomenon that occurs when areas of your screen are constantly displaying the same information – such as your lockscreen – and the pixels that are being used start to hold a ghost image even when you move to something else. There are a number of ways you can prevent this and a couple of ways you can try and correct a burn that's already occurred. The biggest problem area for most devices are the navigation buttons at the bottom of the screen, as they're almost always there and they're almost always white – the worst colour for causing screen burn-in.

Here, we will show you some of the ways you can avoid screen burn-in and walk you through a simple process for trying to correct any burn-in that's already occurred. Nothing is that difficult and you'll only need a rooted device for a couple of the steps. The first thing to do is make sure you've actually got an AMOLED screen. Most flagship devices use the technology nowadays, so it's worth a quick Google of your device to see what sort of screen it's actually sporting. Some of the steps here could have a negative effect on LCD panels, so it's really important to make sure you know what you're dealing with.



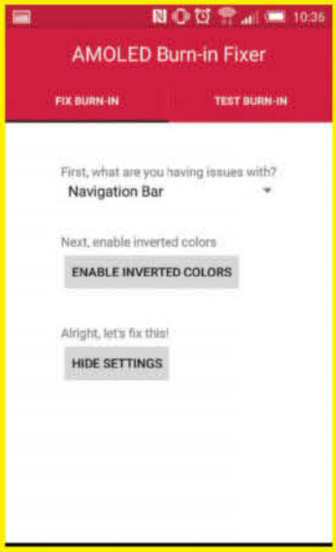
1 Get the app

First, head over to the Google Play store and download AMOLED Burn-in Fixer. As well as being able to fix your screen efficiently, this app will be will be able to diagnose whether you actually need to use it or not, which is useful. It is free and simple to download, so get it installed before you continue onto Step 2.



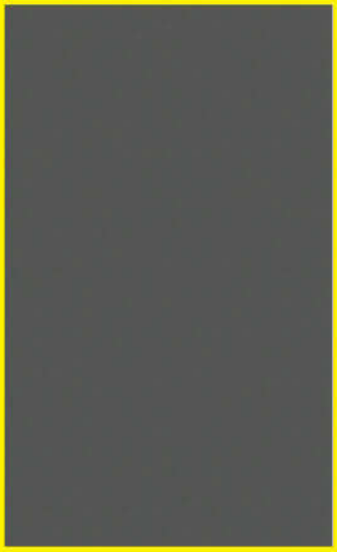
6 White out

The app will now turn your screen white. It is essentially evening out the spread of colour on your device's screen and in doing so, it's waking up the burnt-in area. It might take a couple of tries for it to clear up completely, so it's quite sensible to run this regularly for the best and most permanent results.



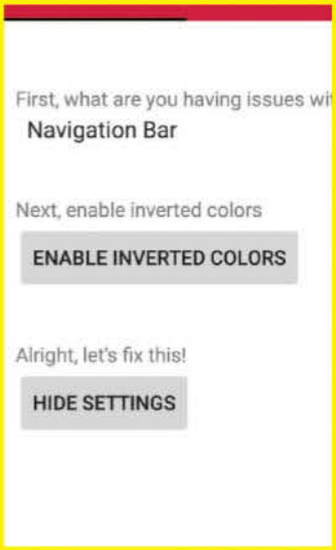
2 Run a diagnostic

Open the AMOLED Burn-in Fixer app on your device, then tap across the main screen to the Test Burn-In page. You will then see a button that says Hide UI. Tap on that and then the test will run. Keep in mind that you are going to have to have a good close look at your screen at this point.



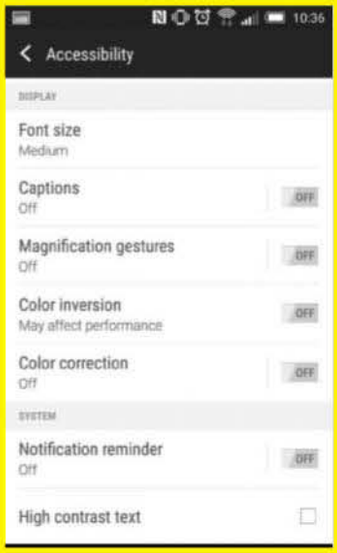
3 Going grey

Once you have tapped the button the screen should display everything in grey. Have a look at the top and the bottom of your screen to see if there is any trace of a ghost image. For example, it could just be a hint of discolouration around the navigation and notification bars.



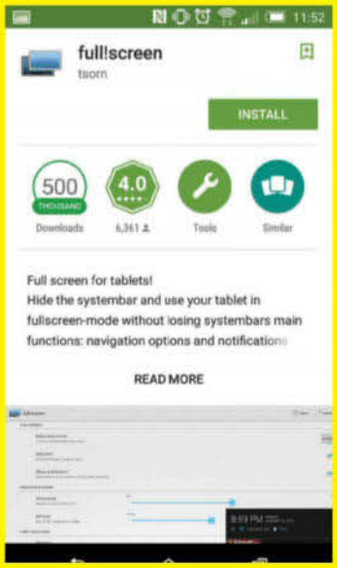
4 Focus on an area

Once you have seen where the problems are, go to the main screen of the app. The drop-down box near the top of the screen will let you select whether you want to focus your attentions on the notifications bar, the navigation bar, or even both of them, so have a look at what you would prefer.



5 Swap the colours

Once you've selected the effected area, tap the button marked 'Enable Inverted Colors'. This will then take you to the accessibility settings menu. Tap to swap the colours round and then head back to the app. Now it is time to sort out your burn-in. Hit the Hide Settings button to make a start.

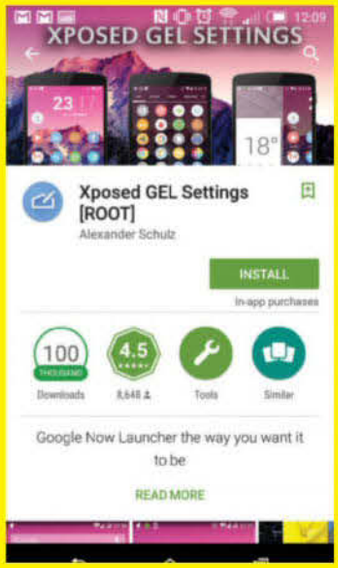


7 Fix burn-in

One way to stop AMOLED screen burn-in from happening is to hide your status and navigation bars from the outset. The best app for this is Full!screen. It's free to download from Google Play, but requires root, and it lets you disable the menu bars and reveal them again with gestures.

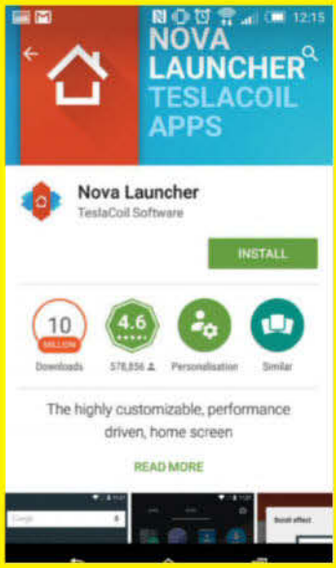
8 Check balance

There are some Xposed framework modules that can help prevent AMOLED screen burn-in as well. Screen Filter is one of the best, as it adds a filter over the whole screen that means you can set your minimum brightness level lower than with your device's default settings.



9 Sort out Lollipop

Lollipop might be a bright and breezier version of Android, but bright colours come at a cost. There's a lot of white and that's the worst colour for AMOLED screens. Try installing Xposed GEL Settings from the Google Play store and tweaking the background colours and app icon sets.



10 New launcher

If you'd rather go for a full overhaul, try installing Nova Launcher. This free download gives you more control over the colours on your screen and, in particular, it will let you use more dark shades. This should save you battery power too because black pixels aren't turned on in AMOLED screens.

Works with Android 3.0 and up **Difficulty Level** Easy

Monitor your mobile data on the go

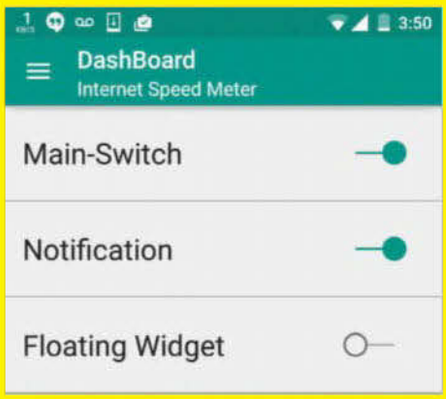
Keep track of how much mobile and Wi-Fi data your device is using

Out of the box, Android smartphones and tablets display the strength of your internet connection in the status bar. But if you want a more detailed view you will need an additional app.

If you want convenience, Internet Speed Meter adds your internet speed to the status bar, so it's always visible. It also creates a permanent notification, so you can see how many bytes your Android device is sending and receiving per second just by opening the notification drawer.

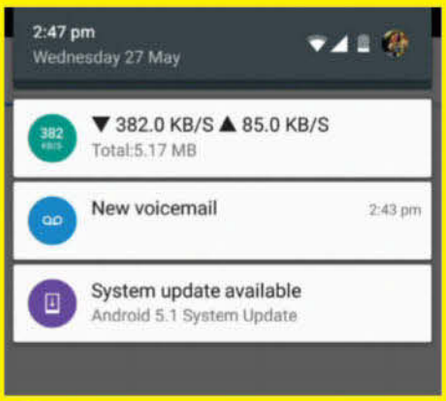
This app distinguishes between mobile and Wi-Fi data and it stores information for up to 30 days.

Download the app free from the Google Play store – it doesn't require root.



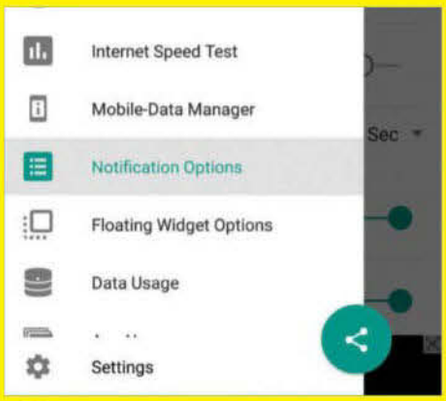
1 Enable notifications

Launch the app, create your profile and log into your new profile. You'll be taken to the app's Dashboard. To add information about your internet connection to the status bar and notification drawer, drag the Notification switch to the 'on' position so it turns from grey to green.



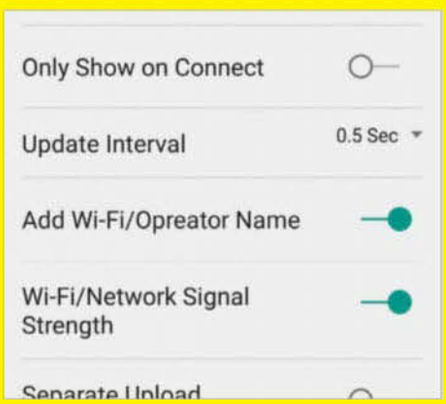
2 Open your notification drawer

The current speed of your internet connection will show in the status bar. Open your notification drawer and you'll see a permanent notification, tracking how many bytes your device is sending and receiving per second.



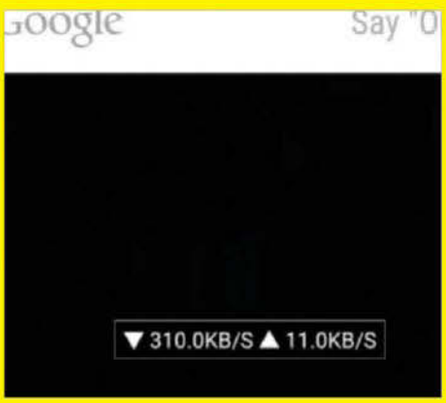
3 Customise your notification

To customise, open the Internet Speed Meter app, tap the menu icon, then Notification Options. Here, you can add the Wi-Fi or operator name so it shows in the permanent notification when your device is connected to it.



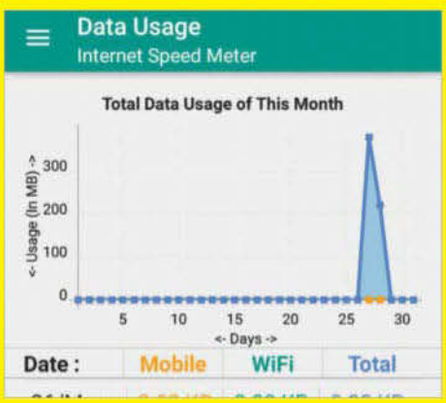
4 Conserve battery

Once you've enabled 'Add Wi-Fi/Operator Name' you can add the signal strength to the permanent notification, using the 'Wi-Fi/Network Signal Strength' slider. When you disconnect from the internet, push the 'Only Show on Connect' slider to pause monitoring.



5 Enable floating widget

In addition to the notification, you can see your upload and download speeds as a floating widget. Go to the app's Dashboard, then push Floating Widget into the 'on' position. You can also completely stop monitoring your usage by turning the main switch off.



6 Track your data usage

This app tracks your data usage over Mobile and Wi-Fi for up to 30 days. To see this data, open the menu and select Data Usage. You will see a graph overview and a table with more detailed information about the amount of Wi-Fi and mobile data you're consuming.

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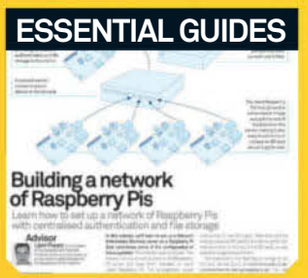

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chrome
chrome
acer
chrome

Chromebook supertest

Which of the lightweight laptops running Google Chrome will be the best?

The first Chromebook launched in 2011, a joint venture between Samsung, Acer and Google. It was a lightweight device that ran Google's Chrome operating system and stored the majority of its data, files and documents in the cloud, rather than on an internal hard drive. This model proved to be very popular and very soon other manufacturers started making their own Chromebooks. The fact that the laptops didn't need much internal memory or storage made them weigh and cost less and the cloud storage meant that losing your computer no longer meant losing all your important documents.

Another key feature of the Chromebook was fast loading times. As they have barely anything to load up you can go to web browsing in under ten seconds, which makes nipping online a breeze.

We've got together four of the latest Chromebooks to find out which is quickest, easiest to use and looks the best. The four we've tested are the Asus C300, Lenovo N20p, Acer 15 C910 and Google's very own Pixel (2015). As they all run on the same operating system, it will be a straight test of their looks and the quality of the user experience that they deliver.

Information

Asus Chromebook C300

£179.99/$229

» More information **asus.com**
» Supplied by **Asus**

Technical specs

» Processor	**Intel Bay Trail-M Celaron N2830 2.16GHz dual-core**
» Memory	**2GB DDR3L 1600MHz SDRAM**
» Dimensions	**339 x 230 x 20mm**
» Weight	**1.4kg**
» Display size	**13.3-inch (117ppi)**
» Display resolution	**1366 x 768 pixels**
» Camera	**HD web camera**
» Connectivity	**Wi-Fi, Bluetooth 4.0**
» Ports	**1 x USB 2.0, 1 x USB 3.0, 1 x HDMI, SD card slot**

head-to-head

Design

The C300 has nice, rounded, curved edges all around, making it a very comfortable machine to carry and use. The brushed look is polarising, however, and it does feel extremely plasticky. It is quite slim at just 20mm thick.

Performance

The dual-core and quad-core processors zip through basic tasks but aren't quite up to anything too intense. Gamers will not appreciate this, but the limited performance is one of the things that will keep the C300 going for 10 hours.

Battery life

The battery life is the big selling point on the C300. Asus claims that it can last 10 hours and it certainly does last very well in normal, everyday tasks, but when the processors are working overtime the battery life suffers quite a lot.

Usability

This is a really well balanced machine. It is a nice height to work at and the keyboard has accurate keys that you have to press firmly, but they don't feel sticky. The trackpad is nice and large, giving users a big range of movement.

Verdict

The C300 was enjoyable to use and only suffered a small amount in performance but it looks okay and has that long battery life

Asus Chromebook C300

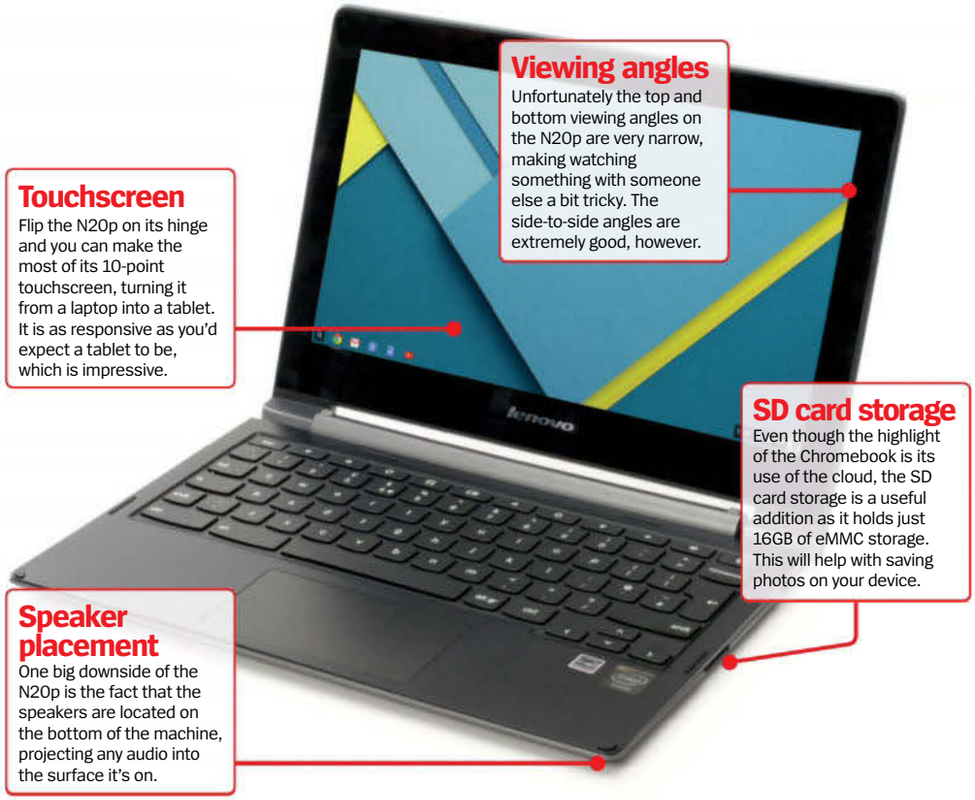
The long-life Chromebook that will ensure you keep going all day

The C300 is the largest of Asus' limited range of Chromebooks. It sports a 13.3-inch screen and weighs 1.4kg, which is very reasonable for its size. It definitely doesn't feel heavy or bulky when you're carrying it around. It has got a very clean and simple design, although the polycarbonate case does feel a little bit scratchy and collects fingerprints quickly. Once you've opened it up it's got an attractive brushed aluminium look and sits at just the right height for you to type away without finding your wrists resting painfully on the fairly sharp edge. The trackpad is the largest in its class and it is very big, making pinch zooming very easy to control. It feels secure and well made, even if there may have been a little bit of skimping on materials.

The keyboard is a generous size and, although it took a little while to get used to the keys all being slightly more to the right than we're used to, the keys were responsive and hit the sweet spot between firmness and sensitivity. It runs off an Intel Celeron 2.16GHz dual-core processor and an Intel Celeron 1.83GHz quad-core processor. In general these are speedy enough to deal with everyday Chromebook tasks, such as writing documents, playing videos and surfing the web. Things do become a little jerky and laggy when playing graphics-rich games so if you are a hardcore gamer, this might not be the best Chromebook for you.

The battery life is the C300's big sell, promising that it can deliver up to ten hours of use. While performing standard browsing tasks it looks like it could make good on that promise, so as a workstation it would be a very useful machine for a working day or taking with you on a long-distance journey. Things weren't so impressive away from browsing – gaming did chew quite dramatically into the battery life, so it is much better suited for professional use.

The video camera is quite sharp, although it did struggle when up against a backlight, so if you enjoy Skype video calls, you'll need to think twice about how the Chromebook is positioned.



Lenovo N20p Chromebook

The Chromebook that is tiny but mighty

Lenovo's ThinkPad range is very well regarded in the world of the PC, so it comes as little surprise that the Chinese company is turning its attention to Chromebooks. The N20p is Lenovo's 11-inch offering, providing a compact Chromebook option at a low price point.

The N20p's big selling point is the fact that it's hinged, so you can fold it right back so the keyboard acts as a stand. This turns the Chromebook, which has a touchscreen, into a upturned tablet, making it perfect for watching films. We found that it did feel a little unstable when tapping on it in this mode, but if you just want to use it for viewing, it is ideal.

Although the 1366 x 768 screen isn't razor sharp, it still plays videos with a high level of clarity and the processors are capable of keeping up with the frame rate. It is impressively bright and colourful, managing to provide the user with a very positive experience.

If you can manage to ignore the overly shiny Lenovo logo on the front, this is a very pleasingly designed laptop. The silver is nice and resistant to fingerprints and it has a mixture of straight edges and curves that complement each other well. It is very smooth all over and the inside has a matt black finish, which works well.

Despite its size it weighs a fairly hefty 1.4kg. This is comparable to the other models, but considering it's the smallest of the bunch that is something of a disappointment. The bezels around the edge of the screen are very large, cutting quite dramatically into the screen size. In a larger machine this wouldn't be so bad but as it's already a small model, this could present an issue for some users.

The keys are very flat and light, which does occasionally lead to a missed letter when typing but in general it is a well laid out and spaced keyboard. The trackpad is very secure in its housing and is responsive to scrolling.

The webcam isn't great at dealing with low light conditions but is nice and sharp, capable of producing high-quality images and video.

Information

Lenovo N20p Chromebook

£210/$329

» More information **lenovo.com**
» Supplied by **Lenovo**

Technical specs

» Processor	**Intel Celeron 2.16GHz quad-core**
» Memory	**4GB DDR3L**
» Dimensions	**295 x 212 x 17.9mm**
» Weight	**1.4kg**
» Display size	**11.5-inch**
» Display resolution	**1366 x 768**
» Camera	**720p**
» Connectivity	**Wi-Fi , Bluetooth 4.0**
» Ports	**1 x USB 2.0, 1 x USB 3.0, 1 x micro HDMI, SD card slot**

head-to-head

Design

We really like the look of the N20p. It is sleek, a lovely shade of silver and has the ability to transform itself into a tablet with a stand. This adaptability sets it apart from its rivals.

Performance

All tasks we put to the N20p were performed to a high standard. We couldn't fault it when playing games or videos. Admittedly nothing was lightning-fast, but then nothing felt slow either, so it would suit all but hardcore users.

Battery life

The battery is lacking a bit at eight hours and does take a hit when playing games, but it should just about see you through a day of medium use without needing to be plugged in.

Usability

The Lenovo unfortunately comes up a bit short in both screen clarity and its keyboard. Neither are a particularly major problem, but the slightly pixel-light screen and slim keys could possibly become an issue for some users.

Verdict

The N20p is the smallest model in the group, but is still powerful enough to deal with most tasks. Its downsides are large bezels around the edges and a disappointing weight for its size

Information

Acer Chromebook 15 C910

£229.99/$229.99

» More information **acer.com**
» Supplied by **Acer**

Technical specs

» Processor	**Intel i3 1.5GHz dual-core**
» Memory	**16GB storage / 4GB RAM**
» Dimensions	**383 x 245 x 24mm**
» Weight	**2.2kg**
» Display size	**15.6-inch**
» Display resolution	**1366 x 768 (100ppi)**
» Camera	**720p webcam**
» Connectivity	**Wi-Fi, Bluetooth 4.0**
» Ports	**1 x USB 2.0, 1 x USB 3.0, 1 x HDMI, SD card slot**

head-to-head

Design

Although the speakers are well placed for excellent audio, the overall design isn't attractive. The backing is strange and plasticky and it's too big for a Chromebook. The keyboard is one of the better ones in the test, however.

Performance

Videos and games do occasionally lag due to the below-par processor, which is a frustration. The screen resolution also is fairly low and is noticeable when there is a lot of action in screen, despite the colours being quite rich.

Battery life

There is plenty of juice in the 3,270mAh battery to keep you going throughout the day when engaged in low intensity tasks. Gaming does quickly crunch through the battery, though, which soon becomes an issue.

Usability

The Acer is the thickest of the four Chromebooks tested here and that is noticeable when using it as the edges do dig into your wrists a bit. The keyboard is the most easily used of the four as it is the widest and best spaced.

Verdict

Acer's entry could be the answer if you're looking for a laptop-sized Chromebook, but otherwise it is difficult to recommend the underpowered C910

Acer Chromebook 15 C910

The C910 is the size of a laptop, but is bigger really better?

The C910 bucks the trend of Chromebooks rather by being a very big machine. The screen is a massive 15.6-inches, and the wide bezels make it even wider. It is unfortunately lacking somewhat in terms of style. The backing is a scratchy, textured plastic that put us in mind of those pull-down blinds for car windows. It is certainly unique but it failed to appeal to us.

Opening up the C910 reveals two large speakers either side of the keyboard, which is great for listening to audio and fills the gaps either side of the keyboard nicely. The keyboard is widely spaced so you have plenty of freedom while typing, and helps ensure typing accuracy. The trackpad is an absolute magnet for fingerprints, though, and does not sit comfortably at all. Even a slight press looks like you're going to push it right out of its housing and it doesn't seem to quite fit, sporting a huge gap along the bottom and right-hand side. It is the heaviest on test at 2.2kg, which is getting far away from normal Chromebook territory and towards notebook and netbook levels.

The screen resolution is a very low 100ppi and this is clearly noticeable when viewing video and images, although it doesn't spoil basic browsing. The Intel Celaron 1.5GHz dual-core processor isn't quite up to the task of playing games or video, occasionally freezing or lagging mid-action. The viewing angles aren't great on the horizontal level, but you do get a high range of viewing on the vertical plane, which is handy.

The 3,270mAh battery has a life of around nine hours, which is one of the main positives for this machine as it could keep you powered through an entire standard work day.

The camera for web chats is very good, producing a clear video that has a lot of detail. Even when backlit, faces can be seen so Acer has done well with its camera technology.

Chromebook Pixel (2015)

Is Google's own Chromebook worth the money?

As the developers of Chrome, it stands to reason that Google should produce its own Chromebook and the Pixel has long been held as the standard bearer for all Chromebooks. That still appears to be the case as the latest Pixel has an awful lot going for it.

The colour scheme is all silver and it is very distinctive with straight lines all round and a very flat finish, setting it apart from the others. This design could put some people off as it is quite metallic and rigid but it certainly looks like a premium machine. It is quite weighty at 1.5kg but that is mostly down to the metal casing that gives it that smooth, premium feel.

The keyboard is edge-to-edge and very nicely spaced so you are unlikely to accidentally tap more than one key. They are very flat so don't take a lot of pressing, which is a great advantage during prolonged use.

Boot up time is lightning quick, which is excellent as that means you get to see the stunning screen as quickly as possible. It really is absolutely glorious. It is superbly sharp, picking out tiny detail in everything with clarity and precision. The resolution is 2560 x 1700 and on the 12.85-inch display that translates to a pixel density of 239ppi, way better than its competitors.

Under the hood is an Intel Core i7 2.4GHz processor that deals with pretty much everything you throw at it with ease. It plays videos and games without any visible lag and navigating around web pages happens instantaneously. It ships with an excellent 16GB of RAM and 64GB storage, plus has a microSD slot.

It's camera has a wide angle lens that helps get more people in shot if you are trying to take a group picture.

Information

Chromebook Pixel (2015)

From £799/$999

» More information **store.google.com**
» Supplied by **Google**

Technical specs

» Processor	**Intel Core i5, 2.2GHz or Intel Core i7, 2.4GHz**
» Memory	**8GB or 16GB**
» Dimensions	**298 x 224 x 15.3mm**
» Weight	**1.5kg**
» Display size	**12.85-inch**
» Display resolution	**2560 x 1700 (239ppi)**
» Camera	**720p HD**
» Connectivity	**Wi-Fi, Bluetooth 4.0**
» Ports	**2x USB 3.0, SD card reader, 2 x USB Type-C charging**

head-to-head

Design

Although some may not be fans of the straight-edged design, it's a clearly premium device, which is smooth and lovely to hold. It looks and feels excellently made, but we found that there is a slight issue over its weight.

Performance

The performance is absolutely impeccable. It boots at speed, loads pages in double-quick time and there is no issue whatsoever when playing games and videos. The i7 processor is effortlessly top of its class here.

Battery life

The battery life is an excellent 12 hours at the maximum, but you'll generally expect to get a little bit less than that. There is no denying that it is affected by gaming, but not to the extent of the other models. It will easily last you a day.

Usability

This Chromebook is the perfect height to use as it doesn't dig into the wrists but you don't have to reach too far for the keys. The touchscreen is really sensitive and you don't feel like you're at risk of breaking the hinge when using it. Overall, it is a pleasure to use and intuitive.

Verdict

The Pixel is by far the best Chromebook on the market, but you are having to pay an extremely heavy price for that quality

The winner... Chromebook Pixel (2015)

You're paying a lot of money but there is no way we could say anything other than the Chromebook Pixel is the best device out there. The screen is streets ahead, the processor is far and away the most powerful on the market and it looks great. The Type-C charging is another huge advantage so it ticks every box in terms of looks, practicality, battery life and quality of use. The only slight faults are with the weight and price, but if you're after a brilliant Chromebook that actually offers some storage capabilities as well, then this has to be the one you choose.

It is followed by the Lenovo N20p. This performed very well in tests and does everything a Chromebook should. It is small, portable and works quickly and quietly. We enjoyed using the touchscreen and the ability to turn it into a tablet is a great touch. If you want a quality Chromebook that doesn't cost an arm and a leg, this should certainly be a contender.

The Asus Chromebook C300 is next up. It is a very good machine, and was generally up to task but fell short a little bit in terms of the processing power and the general look and feel of it.

Finally, the Acer Chromebook 15 brings up the rear. It just felt too big, too heavy and too slow to be a quality Chromebook and we reckon there are much better models out there for the price. It could be a good option if you want a laptop-style cloud-based computer, though.

	Asus Chromebook C300	Lenovo N20p Chromebook	Acer Chromebook 15 C910	Chromebook Pixel (2015)
Processor	Intel Bay Trail-M Celaron N2830 2.16GHz dual-core	Intel Celeron 2.16GHz quad-core	Intel i3 dual core	Intel Core i5, 2.2GHz or Intel Core i7, 2.4GHz
Memory	2GB DDR3L 1600MHz SDRAM	4GB DDR3L	4G RAM, 32GB storage	8GB or 16GB
Dimensions	339 x 230 x 20.3mm	295 x 212 x 17.9mm	383 x 256 x 24mm	298 x 224 x 15.3mm
Weight	1.4kg	1.4kg	2.2kg	1.5kg
Display Size	13.3-inch	11.5-inch	15.6-inch	12.85-inch
Display Resolution	1366 x 768	1366 x 768	1366 x 768	2560 x 1700
Connectivity	Wi-Fi, Bluetooth 4.0	Wi-Fi , Bluetooth 4.0	Wi-Fi , Bluetooth 4.0	Wi-Fi , Bluetooth 4.0
Camera	HD web camera	720p	720p webcam	720p HD
Ports	1 x USB 2.0, 1 x USB 3.0, 1 x HDMI, SD card slot	1 x USB 2.0, 1 x USB 3.0, 1 x micro HDMI, SD card slot	1 x USB 2.0, 1 x USB 3.0, 1 x HDMI	2x USB 3.0, SD card reader, 2 x USB Type-C charging
Overall score				

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Asus ZenFone 2

Asus' latest ZenFone looks to excel on value, but can the Intel-powered newcomer deliver on quality, too?

Asus' latest assault on the Android phone comes via the ZenFone 2, the successor to the ZenFone 4, 5 and 6. The previous generation devices had 4-, 5- and 6-inch screens, hence the names. The ZenFone 2 has two different screen sizes, with 5-inch and 5.5-inch variants available. Confused yet? The variations don't stop there – both 720p and 1080p resolution screens are offered, storage on the devices varies between 16GB and 64GB, RAM is either 2GB or 4GB and there are two different versions of the Intel Atom processor available. The phone is single SIM in some markets and dual SIM in others. Asus certainly doesn't make choosing easy!

Our review device is at the higher end of the range, with a full HD screen, 32GB storage and the 1.8GHz Intel Atom Z3560 rather than the quicker 2.3GHz Z3580. The stand-out item on the spec sheet for this phone is definitely the 4GB RAM, which should mean applications virtually never get swapped out of memory. At a time where some flagships are still being shipped with 2GB RAM, this is a pretty significant feature for what is, even at its very highest specification, a mid-range device.

From a design perspective, the ZenFone 2 integrates the DNA of its predecessors with a sprinkling of inspiration from competitors. The area containing the capacitive buttons on the front retains the hallmark 'spun metal' look, but switching around to the back of the device you'll notice that the volume rockers have moved from the side in a feature that is very reminiscent of LG's handsets. The power button is on the top of the device, which makes it a little bit of a stretch to reach. The benefit of having the buttons on the back is that it enables Asus to shrink the bezels alongside the screen, although a 72 per cent screen-to-body ratio is good but not as exceptional as we've seen on devices such as the LG G2. And you should make no mistake – the ZenFone 2 is not a small device. The phone has a removable plastic back under which sit the SIM and microSD slots – despite this, the battery is not replaceable. The back cover has a brushed metal effect and is available in white, black, red, grey and gold.

Imaging on the ZenFone 2 comes courtesy of a 13MP camera on the back and a 5MP camera on the front. The rear camera uses a Toshiba sensor together with a dual tone LED flash to provide what Asus calls 'class leading' low-light performance. For a mid-range device, pictures do generally come out well, but the ZenFone 2 is

Fast charging

The ZenFone 2 supports BoostMaster fast charging, with an 18W charger included in the box with the 2.3GHz device. Ten minutes power provides 2.7 hours of 3G talktime. The battery can be recharged from empty to 60 percent full in under 40 minutes.

Customisabe look

Asus' version of Android Lollipop is called ZenUI and is fully customisable with colours, icon packs and fonts. ZenMotion provides gesture control and a double-tap on the home button shrinks the screen with a clever one-handed mode.

Responsive screen

The IPS screen on the ZenFone 2 is bright, sharp and extremely responsive – a 60m/s touch response time contributes to the overall impression of smoothness and speed on the device. Gorilla Glass 3 plays its part to help protect the display from damage.

Super-fast connectivity

The ZenFone 2 supports 4G LTE connectivity at up to 250Mbps CAT4+ speeds and Wi-Fi 802.11ac at up to 433Mbps. Bluetooth 4.0 and NFC are included to complete the connectivity suite. The dual SIM model supports dual active SIMs (2G on the second SIM).

unfortunately outperformed by cameras found on LG and Samsung flagship devices. Super HDR further enhances results in difficult lighting conditions. For selfie fans, the front-facing camera has a 85 degree wide angle lens and takes very clear shots.

The ZenFone 2 runs Android Lollipop with Asus' own 'ZenUI' extensions. ZenUI basically conforms to the standard template for manufacturer customisations – tweaked icons, slightly modified core apps and a sprinkling of add-ons of varying utility. Privacy protection tools, a kids mode and downloadable themes are the highlights but on the whole the software build feels well done and not excessively heavy.

An Intel processor is still something of a rarity in an Android phone, but the ZenFone 2 demonstrates perfectly why it really should be a consideration. Despite having the slower of the two processors on offer, the device really flies. The 4GB RAM no doubt helps when running lots of big applications, but we saw instant responsiveness, no tangible lag and overall performance that matches or even eclipses that of the very highest-end Android phones you can buy today. Given that the 1080p device performs so well, we expect that the 720p phones would feel blistering fast. We'd have no hesitation recommending the ZenFone 2 from a performance perspective. ■

Information
Asus ZenFone 2

£210/$300

» More information **Asus.com**
» Supplied by **Asus Europe**

Best deal

EE	O2	vodafone
£10 per month (PAYG)	£10 per month (PAYG)	£16 per month (PAYG)

Technical specs

- Operating system: **Android 5.0 Lollipop**
- Processor: **Intel Atom Z3560 1.8 GHz quad-core**
- Memory: **32GB storage / 4GB RAM**
- Dimensions: **77.2 x 152.5 x 3.9 ~ 10.9 mm**
- Weight: **170g**
- Display size: **5.5-inch**
- Display resolution: **1920 x 1080 pixels (400ppi)**
- Front camera: **5 MP (f/2.0)**
- Rear camera: **13 MP (f/2.0)**
- Connectivity: **4G**
- Expansion slot: **microSD (up to 64GB)**

Battery life

The 3,000mAh battery provides an easy full day's charge with fast charging available with a compatible adaptor

Good for

Quick performance

If you demand fast performance without paying flagship prices, the ZenFone 2 is a great option

Wireless connectivity

The ZenFone 2 ticks all the boxes on the spec sheet, particularly around wireless connectivity

Bad for

Auto focus

Although the ZenFone 2 camera is okay, auto-focusing in particular can be a little slow

Svelete design

Despite Asus' claim of shrunken bezels, the phone is still quite big and chunky, and therefore not for everyone

Verdict

The ZenFone 2 is a little bit different but all the better for it. All in all, a great value phone

Honor 6 Plus

As Honor graduates to offering devices on contract with Three, can it better the excellent Honor 6 with its latest device?

When we reviewed the Honor 6, we called it 'very impressive' and gave it a four out of five rating. Can the Honor 6 Plus go one better? On paper it looks promising. As well as boosting the full HD screen from 5-inches to 5.5-inches, the Honor 6 Plus has an extra camera on the back, a better front camera, a faster processor, more storage and a bigger battery.

When holding the Honor 6 Plus with the original device, the family resemblance is clear. The glass front and back with the curved plastic base is retained and, as with the original, it's a good-looking device. It does feel big in the hand, but with 5.5-inch devices becoming more and more popular, it is less of a concern than it might have been six months ago. At 7.5mm thick, the device doesn't feel too bulky. The dimensions are particularly impressive given the huge battery that is included. The buttons on the device are sensibly placed and click reassuringly. Both the volume and power buttons are on the right-hand side, just above the main SIM slot and the secondary SIM slot (which can be used as a microSD slot). The 3.5m headphone port is on the top of the device alongside the IR blaster.

One of the more polarising aspects of the Honor devices is the EmotionUI skin. The Honor 6 Plus ships with Android 4.4 KitKat, with a Lollipop upgrade due in the next few months. We are seeing a lot of Lollipop devices struggle for performance and battery life, two things that the 6 Plus certainly doesn't have an issue with. In use the device is extremely fast and as smooth as anything else on sale. Unquestionably, EmotionUI does make a lot of changes to base Android. It brings new colours, new icons, a drawer-free home screen / launcher; all things that might not be to everyone's taste. While some tweaks aren't what we'd consider a worthwhile change, there are a lot of changes that do enhance the base Android experience. It's only as you get to know the device that you'll come across them. Enhanced permission control, improved device storage / memory management, double-tap to wake and screen off gestures; version 3 of Huawei's skin is finally starting to provide genuinely useful features.

One of the most intriguing aspects of the Honor 6 Plus is the camera (or rather cameras). On the back of the device you'll notice a parallel dual 8MP camera setup, designed to provide improved performance in low light and an ultra-fast focus time of 0.1 seconds. The setup also enables a 'dual aperture' mode, with an

Speed demon

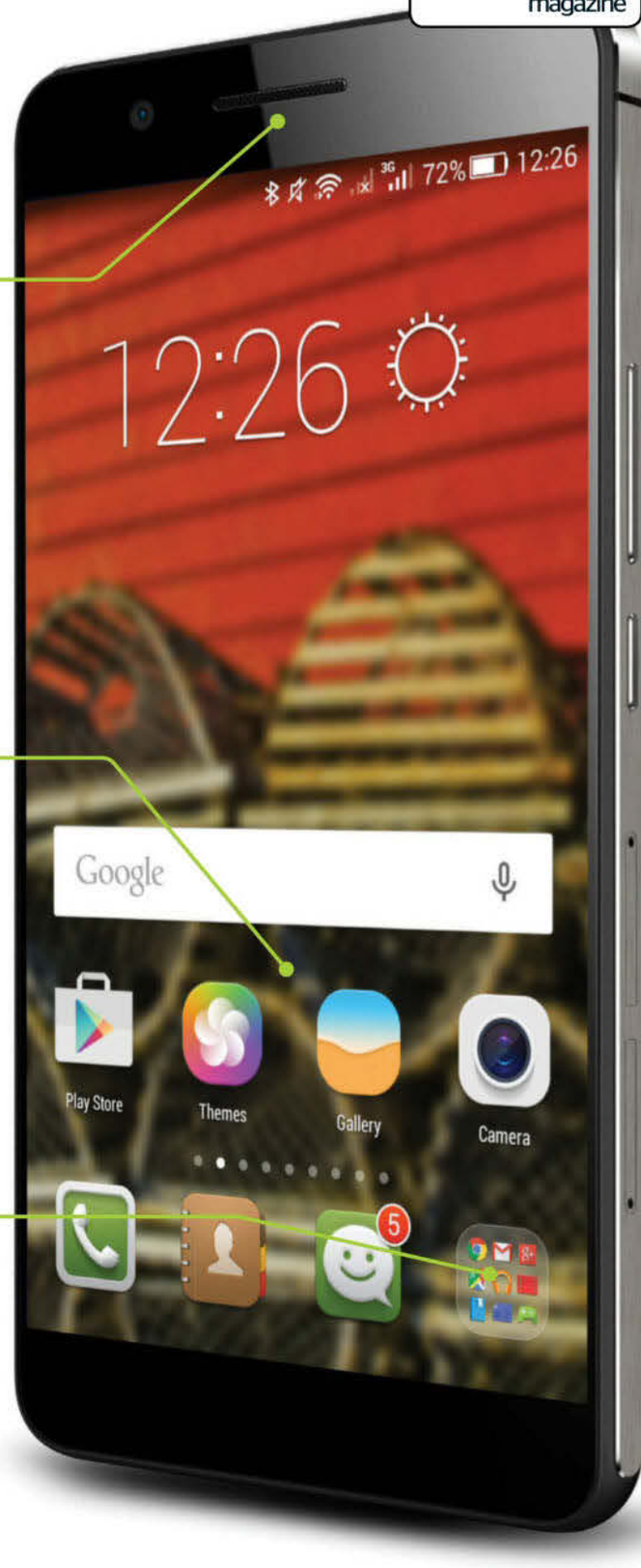
If you are a fan of benchmarks you might be surprised that the Honor 6 Plus, while not matching the latest Snapdragon or Exynos chips, isn't far behind. The Kirin 925 is a very capable processor.

Touch to control

The Honor 6 Plus uses on-screen buttons as standard, like Nexus devices. An optional 'TouchPlus' overlay can be purchased, which adds capacitive buttons at the bottom of the screen in addition to touch sensitive areas at the top of the display.

Draw to open

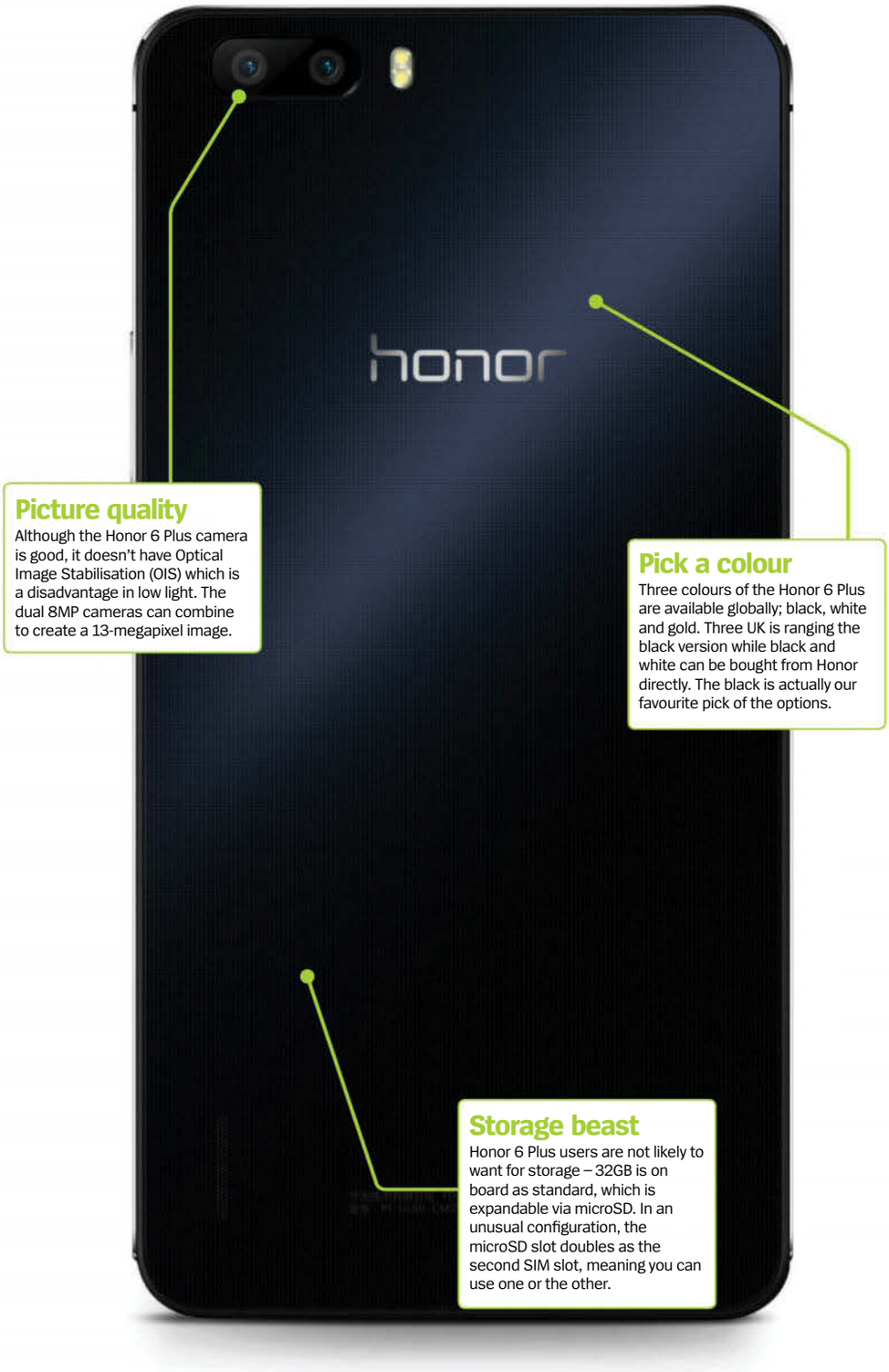
The 'Draw' feature on the phone allows a shape to be drawn on the screen while the phone screen is off, to then open an associated application. Note however that only c, e, m and w can be defined.



onscreen slider allowing variable levels of background blur. The camera application itself, while appearing pretty basic at first use, provides a lot of manual controls. So what are the photos like? Impressive, particularly for a mid-range device. While they can't match the likes of the Samsung Galaxy S6 or LG G4, the camera innovation is worthwhile, easily outperforming devices at a similar price point.

It's unexpectedly hard to find things not to like about the Honor 6 Plus. If you are a big stock Android fan then you might find the Emotion UI skin jarring at first, but give it a chance and you'll be pleasantly surprised. It's a shame you can't use dual SIMs and a microSD card, but this is offset by a generous 32GB of storage as standard. Honor is so confident of the phone's battery life that you can even use it as a battery pack to charge another device!

Big name manufacturers should be concerned. As with the Asus ZenFone 2 we reviewed on page 68, the Honor 6 Plus marks another stride from lesser-known manufacturers towards making more expensive devices unnecessary.



Picture quality
Although the Honor 6 Plus camera is good, it doesn't have Optical Image Stabilisation (OIS) which is a disadvantage in low light. The dual 8MP cameras can combine to create a 13-megapixel image.

Pick a colour
Three colours of the Honor 6 Plus are available globally; black, white and gold. Three UK is ranging the black version while black and white can be bought from Honor directly. The black is actually our favourite pick of the options.

Storage beast
Honor 6 Plus users are not likely to want for storage – 32GB is on board as standard, which is expandable via microSD. In an unusual configuration, the microSD slot doubles as the second SIM slot, meaning you can use one or the other.

Information

Honor 6 Plus

£289.99/$468

» More information **hihonor.com**
» Supplied by **Three UK**

Best deal

Three	O2	EE
£24 per month (Contract)	£15 per month (PAYG)	£15 per month (PAYG)

Technical specs

- Operating system: **Android 4.4 KitKat**
- Processor: **Cortex-A15 1.8 GHz quad-core & Cortex-A7 1.3 GHz quad-core**
- Memory: **32GB storage / 3GB RAM**
- Dimensions: **150.5 x 75.7 x 7.5mm**
- Weight: **165g**
- Display size: **5.5-inch**
- Display resolution: **1920 x 1080 pixels**
- Front camera: **8MP**
- Rear camera: **8MP (dual camera)**
- Connectivity: **4G**
- Expansion slot: **microSD (up to 128GB)**

Battery life

The 3600mAh battery means the 6 Plus goes on and on – outlasting almost any other device available today

Good for

Media mogul

The 5.5-inch IPS screen is sharp and bright, making the Honor 6 Plus great for media consumption

Signal strength

Reception and signal are excellent. Dual band Wi-Fi is included, as well as Bluetooth 4.0 and NFC

Bad for

Overly emotional

Despite its customisation features, purists will still hate the Emotion UI and its Android iteration is out of date

Forced to share SIM slot

If you'd like to have a dual SIM phone and expand the memory, you're all out of luck with the Honor 6 Plus

Verdict

The Honor 6 Plus is more than enough phone for all but the most demanding of users – impressive

BT Home SmartPhone SII

Can adding Android apps make your landline relevant again?

When was the last time you used your home phone? If you're struggling to remember, you're not alone. Over half of the UK say they 'rarely' or 'never' use their landlines to make calls, with three in four adults admitting that they view home phones as a thing of the past. This is bad news for BT, the telecom company that operates the lion's share of the country's phone lines. To make 'the home phone central to family life again,' it has come up with the Home SmartPhone SII. Reinventing what a home phone can do, this handset is not only cordless and sporting a touchscreen display, but it is Android-powered, Wi-Fi enabled and with a direct hotline to the Google Play store.

The SmartPhone SII has a 3.5-inch capactive touchscreen, 2MP front-facing camera, 2MB memory, HD audio, a 1,400mAh battery and runs Android 4.2 Jelly Bean. None of which would we consider even relatively good specs if this was intended as our main device, but as the SmartPhone SII is only going to serve as a companion to our mobile, we're willing to let it slide. Also, while the memory is very small, BT claims it is enough to store 1,500 contacts, so you can throw away your old address book. It also has a microSD slot so you can further expand the memory if you so wish.

The actual build quality of the SmartPhone SII is very good. While it is only made of plastic, the handset has a stylish curve and silver-coloured band, which make it stand out from your run-of-the-mill home phone. The SII also includes a cradle to store and charge your phone, as well as a base station.

Running Android 4.2 Jelly Bean, the SII is pre-installed with all the Google apps and you can download all your third-party favourites from the Play store. Twitter and Facebook are also bundled in, along with some own-brand BT apps. Some of these seem unnecessary, for instance, if you have a BT Sport subscription, you can stream live football matches to your BT Home SmartPhone. But who would want to watch anything as long as that on a 3.5-inch, low-resolution screen?

An app that is better suited to a home phone is Nuisance Calls. With the power to block all those pre-recorded PPI claim calls and the telesales that always ring at teatime, this feature made us sit up and take the SmartPhone SII seriously. Nuisance Calls works in multiple ways. Firstly, you can restrict incoming calls using the Do Not Disturb button, which will block all calls except numbers saved as VIPs (not unlike

Disappointing display

At 3.5-inches the SmartPhone SII not only has a much smaller display than your average smarpthone, but the quality is also very poor for a £170 handset, with low resolution and disappointing viewing angles

Play apps

While the original SmartPhone SI could only access the restricted Opera Mobile Store for apps, the SII comes pre-installed with Google Play so you can download all your favourite apps and games

Block nuisance calls

One of the SmartPhone SII's best features is the ability to banish telesales callers. Its Nuisance Calls app is highly customisable, so that you can blank ban all unwanted calls with Do Not Disturb mode or add individual numbers to a black list.

"Considering the personal nature of apps, using Facebook and Twitter didn't feel conducive to a shared phone"

Android Lollipop's Priority Mode). For a degree of automation, you can also set Do Not Disturb to switch on and off between set times, for example, overnight. Alternatively, you can tweak your block list to only affect international calls or withheld numbers, or manually add ten numbers to a block list. Not only will blocked calls not be able to ring your home phone, they won't be able to leave an answerphone message. You can also restrict outgoing calls so that no one can use the landline to call expensive numbers, such as mobile phones or international numbers.

However, having used the SmartPhone SII for four weeks, we ultimately found little use for it. The peace of mind Nuisance Calls afforded us was great, but we didn't find ourselves calling from the house phone any more than we did before. We also didn't find ourselves using any apps other than Chrome on the SII. Considering the personal nature of apps – which generally log into your private accounts or learn your habits to become more personalised round an individual – using Facebook and Twitter didn't feel conducive to having a shared phone, which could be picked up any time by anyone else that we live with. Which is where, BT would say, the base station comes into play. This router-shaped box can be used to register multiple SII handsets, so everyone in the house can have a private headset. This might suit a family environment with children who aren't yet trusted with a proper smartphone, but seems rather pointless and worse still, expensive. The SII on its own costs £170, with additional handsets sold separately. ■

Wireless calling

The SmartPhone SII is cordless so you can use it anywhere within the 50m range of the base station. It also connects to your Wi-Fi so you can surf the web just as you would on your smartphone.

All about that base

Along with the handset and charging cradle, when you buy the BT SmartPhone SII you are also supplied with the base station. This device plugs into your landline and transmits calls to your handset. You can also register other SII handsets to the base station as well, but you will have to buy these separately.

Information

BT Home SmartPhone SII

£169.99/$N/A

» More information **bt.com**
» Supplied by **BT**

Technical specs

- » Operating system..... **Android 4.2 Jelly Bean**
- » Memory..... **2GB storage**
- » Dimensions..... handset: **150mm x 70mm x 20mm**
  charger: **35mm x 125mm x 71mm**
  base unit **125 x 14mm x 45mm**
- » Weight..... **123g**
- » Display size..... **3.5-inch**
- » Front camera..... **2MP**
- » Connectivity..... **Wi-Fi**
- » Expansion slot..... **microSD**

Battery life

Though it is better to store your SII in its charging dock, the handset boasts 65 hours standby time, which should be long enough to find it again when you lose it down the back of the sofa

Good for

Second screen

The SII was useful for web-browsing when we couldn't find our actual smartphone or for sharing with children

Call blocking

Highly customisable settings for blocking incoming and outgoing calls did manage to go some way to greatly improve the home phone experience

Bad for

Poor display

The 3.5-inch display is far too small and low resolution to watch video for an extended time

Shared device

The communal nature of a landline doesn't gel with personally-focused and often highly private apps

Verdict

BT has done its best to make the home phone relevant again, but we're afraid the time has come to pull the plug on the landline

Honor 4X

Can Huawei's monster-sized budget device prove the company deserves recognition as one of Samsung's closest competitors?

Despite being the third biggest smartphone manufacturer in the world, Huawei is still not a household name outside of Asia. While the high-end P7 showed off the company's technical prowess, it faced stiff competition to really stand out in the already saturated smartphone market. The Honor 4X is a different device entirely, aimed at the truly budget market and one that asks the question: what do you expect for £150?

Well, a lot it would seem. Sporting a 5.5-inch display, the Honor 4X is one of the biggest budget devices we've ever seen. While the size will certainly split opinion, the device is surprisingly lightweight and thin enough to use in one hand – just. The addition of a lightly textured back gives the device a premium finish, but the rest of the device is purely made of plastic. That's not to say the plastic shell of the 4X isn't robust, but there's a slight – and we mean slight – flex in the shell. Housed behind the removable back plate sits a microSD and dual-SIM slots for increased network coverage, but unfortunately the 3,000mAh battery is non-removable.

Turning on the device reveals Huawei's own Emotion UI. The colourful animations and enlarged icon arrangement certainly won't be to everyone's tastes, but it's one of the easier custom interfaces to move around. There's an array of gestures to help get around the device quickly and we especially liked being able to use three fingers on the screen to open the Customise menu. Due to the scale of animations used throughout the UI, you'll be relying heavily on the 2GB RAM and octa-core processor. It's certainly a lot of power for a budget device, but it never really seems you're getting the full force of this combination. It could be down to the configuration that Huawei has chosen to use, but it does leave the device feeling a little sluggish from time to time when it really shouldn't.

You're dealing with a 13MP camera on the rear of the 4X. Image quality tends to be mixed, but with the right combination of settings, the finished products can be impressive. There's also the addition of a superb Beauty Shot mode that instantly improves the quality of any image you're lining up to take. Video recording is available in 1080p, but the display only sports a 720 x 1280 resolution, so you won't really be able to enjoy any true HD content. While saving these snaps on the 4X is a possibility, you're going to want to keep a microSD card to hand. Although 8GB of storage is advertised, half of this is usable. This shows the extent of how

Price is right

You can't argue with the £149 price tag of the Huawei Honor 4X. No matter how you look at it, this is great value for money and many of its errors can be forgiven.

Lack of Emotion

While there have been some noticeable improvements to the Emotion UI, it still feels clunky to use at times. We recommend cutting down on some of the built-in animations.

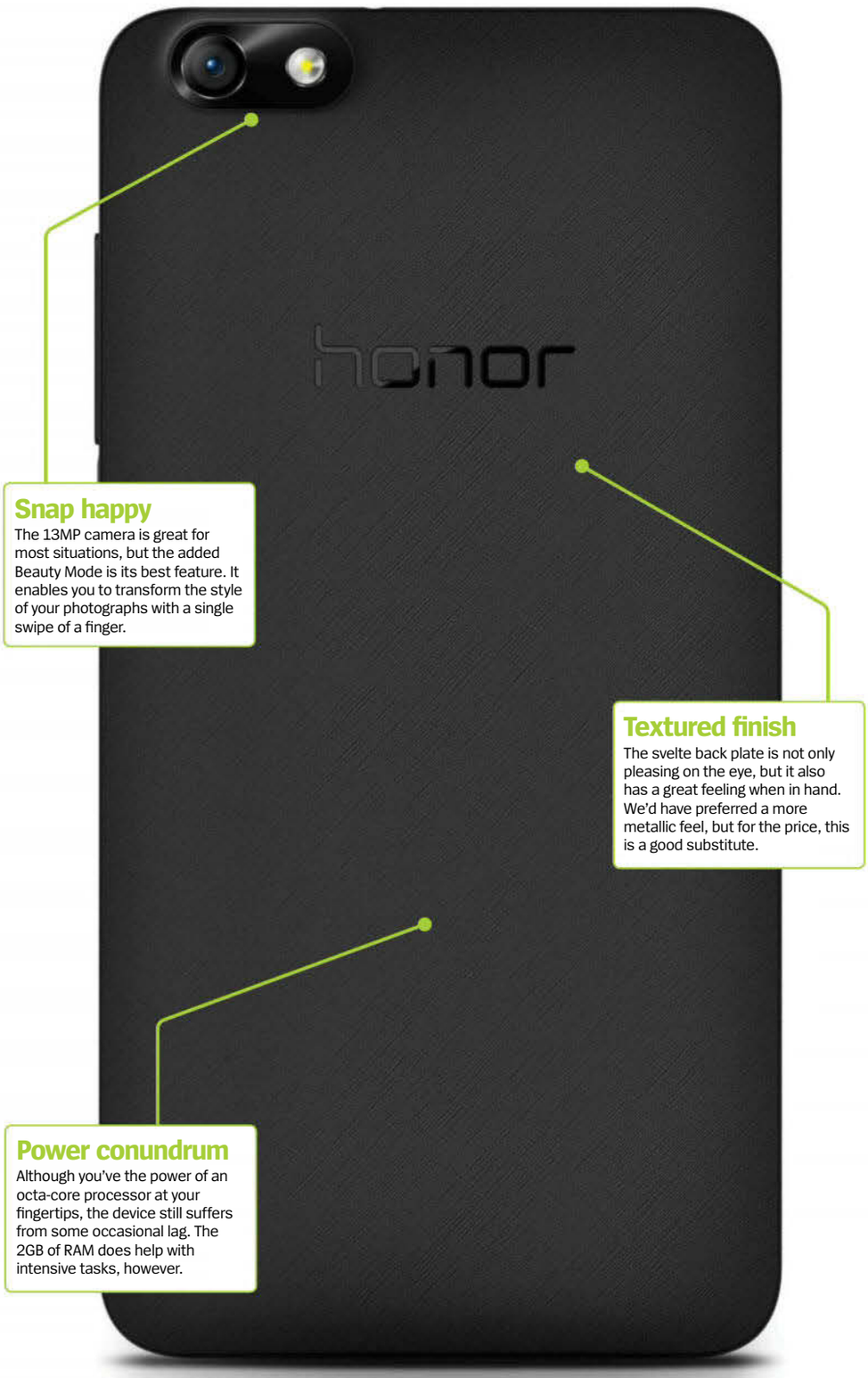
Gesture control

To help move around the device easier, Huawei has added several intricate gestures into the device. You'll find a dedicated menu within the settings apps that enable you to alter the ones that you want to have installed.

large the Emotion UI really is, especially when you consider there's little in terms of bloatware.

One of the primary cutbacks we find with budget devices is their choice of battery size. However, we were happy to be proved wrong with the 4X. While the intensive Emotion UI won't do the 3,000mAh battery any favours, you'll be able to get 10 hours of life from heavy use. It perhaps doesn't sound impressive, but for a device of its size and price, it's fairly remarkable.

Huawei's aims at making a name for itself overseas is admirable, but it's going to take a device that really stands out from the rest to make even the smallest dent in Samsung's or HTC's sales in either the US, UK or most other major territories. While the Honor 4X is certainly impressive for what it offers for £150, and it's undeniable you're getting a lot of smartphone for your money, there are similarly-priced alternatives on the market that are just a little more refined. This is definitely a solid start by Huawei, but there are necessary improvements to be made with the Emotion UI before this can ever be considered a must-have device. ■



Snap happy
The 13MP camera is great for most situations, but the added Beauty Mode is its best feature. It enables you to transform the style of your photographs with a single swipe of a finger.

Textured finish
The svelte back plate is not only pleasing on the eye, but it also has a great feeling when in hand. We'd have preferred a more metallic feel, but for the price, this is a good substitute.

Power conundrum
Although you've the power of an octa-core processor at your fingertips, the device still suffers from some occasional lag. The 2GB of RAM does help with intensive tasks, however.

Information

Honor 4X

£149.99/$299.80

» More information **hihonor.in**
» Supplied by **Huawei**

Best deal

EE	Three	vodafone
£10 per month (Contract)	£11 per month (Contract)	£11.50 per month (Contract)

Technical specs

- Operating system: **Android 4.4.2 KitKat**
- Processor: **Cortex-A53 1.2GHz octa-core**
- Memory: **8GB storage / 2GB RAM**
- Dimensions: **152.9 x 77.2 x 8.7mm**
- Weight: **165g**
- Display size: **5.5-inch**
- Display resolution: **720 x 1280 pixels (267ppi)**
- Front camera: **5MP**
- Rear camera: **13MP**
- Connectivity: **4G**
- Expansion slot: **microSD (up to 32GB)**

Battery life

The 3,000mAh battery will give you enough power to see you through a day of medium use

Good for

Those on a budget

You really can't argue with the lowly price of the Honor 4X, it's a lot of device for little money

Easy handling

While the design is nothing special, it feels great in the hand and fairly robust for a bigger device

Bad for

Power use

Emotion UI still needs a little work to be less power-centric. Animations are also garish.

Display resolution

At 267ppi the display lacks the high-quality finish we've seen in similarly priced smartphones

Verdict

Huawei has potential to be a massive player on these shores, but the Honor 4X isn't going to be the breakthrough device

Information

Vodafone Tab Prime 6

£150 / $N/A

» More information **www.vodafone.com**
» Supplied by **Vodafone**

Best deal

vodafone

£17
per month
(Contract)

Exclusively on Vodafone, you can buy this tablet for £150 pay as you go with 6GB data, or get it on contract for £17 per month with an upfront cost of £19 and get 1GB data

Technical specs

» Operating system	**Android 5.0 Lollipop**
» Processor	**Qualcomm Snapdragon 410 1.2GHz quad-core**
» Memory	**16GB storage / 1GB RAM**
» Dimensions	**244 x 146 x 7.9mm**
» Weight	**406g**
» Display size	**9.6-inch**
» Display resolution	**1280 x 800 pixels (157ppi)**
» Front camera	**5MP**
» Rear camera	**2MP**
» Connectivity	**4G**
» Expansion slot	**microSD (up to 32GB)**

Battery life

It has a sizeable 4,060mAh battery but drains rather quickly, especially when being used for gaming

Good for

Easy to hold

This tablet is very comfortable to hold and is surprisingly light for a device of its size

Quick browsing

A big plus is its 4G signal capabilities, so you can enjoy super-fast internet connections

Bad for

Watching video

The screen is a very low resolution, something which is painfully obvious when watching videos

Performance speed

The processor definitely struggles with high-intensity tasks and got a low benchmark score for this area

Verdict

This is a well-packaged tablet that is reasonably priced and perfect for web browsing on the go

Vodafone Tab Prime 6

Is it prime time for the 4G tablet?

Vodafone is building up a range of devices locked to its network and the Tab Prime 6 claims to be the carrier's biggest, best and fastest tablet to date.

We can't disagree with it being the biggest. The mammoth screen is 9.6-inches. Despite this, it only weighs 406g, so Vodafone has worked well to keep the bulk down. The backing is a smooth, grippable rubber, which feels neither premium nor cheap and is fingerprint-proof. It is nicely designed, with two protrusions for the power and volume buttons. The slot for the SD card and SIM card tucks in nicely, as does the headphone jack. It's comfortable to hold, despite the size, even though one-handed use is unlikely.

However, the screen is where we find the Prime 6's first flaw. At 157ppi, the pixel count is low and you can see the difference between this model and most other tablets out there. Videos are pixelated and the viewing experience is not good. On the subject of videos, the Snapdragon 410 processor struggles with playing them and a benchmarking test confirmed that the Prime 6's video and game playing speeds were below average. Web pages loaded and ran snappily, however, so this is clearly a tablet for casual use and not streaming.

Tablets are notorious for their poor-quality cameras and the Prime 6 doesn't push the boat out here, offering a 5MP rear-facing camera and a 2MP front-facing camera. However, both cameras are good as long as you're not shooting anything too close. Anything less than a foot away is blurry, but the further away things are, the sharper it seems to get. Selfies are grainy with the front-facing camera but on the whole, both do a satisfactory job.

It ships with Android Lollipop, which is a positive inclusion, is 4G compatible and comes loaded with 1GB RAM and 16GB storage, which can be supported by microSD up to 32GB. It retains the majority of that storage too, as it's not laden down with extra apps, so 16GB isn't too bad. It does come with Peel remote control pre-installed, designed to work with the subtle IR blaster on the top of the tablet.

The battery did drain quickly, dropping over 20 per cent after less than an hour of medium use, so that is something to consider if you're planning on playing games or using a lot of 4G.

Archos 50 Oxygen+

How does this light-as-air phone manage to stack up against its budget rivals?

Archos has been around for 17 years, but it was only in 2013 that it expanded into the smartphone market, generally hovering around the £100-£150 price bracket. The 50 Oxygen+ is at the top of its list in terms of specs and price, taking it right into Moto G and Asus ZenFone 5 territory. Low-price phones is an increasingly key battleground and manufacturers are having to pull the stops out on all devices, including the bargain basement ones.

The spec sheet on the 50 Oxygen+ is pretty impressive. It runs Android 4.4 KitKat on a nippy 1.4Ghz octa-core Mediatek MT6592 processor. It packs 1280 x 720 pixels into the 5-inch HD screen at 294ppi and the colours are rich and deep, for an enjoyable user experience.

It comes with 1GB RAM and a reasonable 16GB storage, expandable to 64GB via the microSD slot. This is fairly standard for handsets in this price range and the lack of pre-installed bloatware means that well over 12GB of that memory is still available out of the box.

It runs a very vanilla version of Android with little in the way of customisation. The only difference we really noticed was in the camera app that is very limited in terms of additional features, but the swipe method to show the menu is pleasingly innovative.

The Archos has an 8MP rear-facing camera and 5MP on the front. The former is quick to focus and adapts well to various lighting conditions, while the latter doesn't cope quite so well when the light is bright or dark, although in normal conditions it is a good selfie snapper.

Visually Archos has clearly gone down the route of the iPhone 6, with a black front, grey rear and camera placement in the top corner. It's a very basic design that looks sleek and it's smooth enough to feel comfortable in the hand but is also rough enough to provide grip.

Overall we're going to have to give the Archos 50 Oxygen+ a lot of credit. It is light, looks attractive and doesn't feel too cheap. The cameras are fairly limited but perform well and we didn't suffer any grainy images like some budget phones. It's not particularly fast despite the octa-core processor, but you don't feel like you're hanging around. Games and videos all play fine. In the 50 Oxygen+ Archos has created a real contender in the budget mobile market.

Information

Archos 50 Oxygen+

£149.99 / $169.99

» More information **www.archos.com**
» Supplied by **Archos**

Best deal

EE	O2	vodafone
£15 per month (Contract)	£15 per month (Contract)	£10 per month (Contract)

Technical specs

- Operating system: **Android 4.4 KitKat**
- Processor: **Mediatek MT6592 1.4Ghz octa-core**
- Memory: **16GB storage / 1GB RAM**
- Dimensions: **143 x 72.5 x 7.2mm**
- Weight: **125g**
- Display size: **5.0-inch**
- Display resolution: **1280 x 720 pixels (294ppi)**
- Front camera: **8MP**
- Rear camera: **5MP**
- Networks: **3G**
- Expansion slot: **microSD (up to 64GB)**

Battery life

You can expect to get no more than a day's usage out of the 2,000mAh battery

Good for

High-quality display

The screen is one of the phone's best features. It's sharp, bright and wonderfully colourful.

Easy handling

At 72.5mm wide and 125g, it is a comfortable fit for the hand and pleasantly light

Bad for

Speed demons

Performance can lag a little bit at times and the 50 Oxygen+ is slower than some of its rivals

Basic features

The phone is a little bland, both in terms of design and the apps it ships with

Verdict

We would certainly suggest it as a bargain device, unless you need your phone to be super fast

iRig UA

Turn your Android into an amplifier with the iRig UA

Lugging around an amplifier wherever you go can be a right pain for guitarists, but luckily the iRig is here to save all you budding Slashes and Hendrixes. The iRig UA is a palm-sized, ultra-light device that you use to transform your mobile into a music amp in seconds.

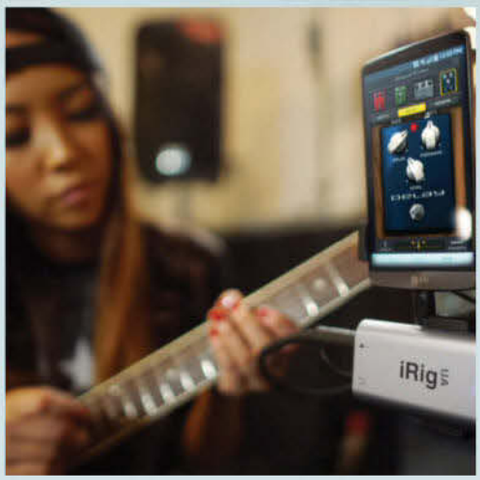
The company's popular Amplitube app has an excellent user interface, which manages to recreate the look and feel of an elaborate amp setup. Each screen has a number of dials and switches that you can alter to your liking, which you can then queue up on your phone's screen in order to create the exact effect you are going for.

The app enables you to alter dozens of different sounds and even includes options to tweak feedback levels and a wah pedal, giving guitarists the full creative experience. It's ideal for almost any genre of music, possibly apart from very heavy metal as the sound produced is a bit too clean and lacks that meaty edge, but on the whole you can successfully adapt the sound to most styles.

The sound latency – the time difference between playing and hearing a note – is absolutely superb, with audio occurring almost instantaneously. This is vital for a musician to hear music as it's being played and the iRig is certainly one of the best products around for transmission speed.

However, using the iRig does drain your phone's battery quite considerably. Our tests showed a loss of 25 per cent of battery in just 20 minutes of playing. If you're planning on having a long music session, it would be wise to have a replacement battery ready as the iRig plugs into the microUSB port where your charger would normally go. This is quite frustrating, but battery drain is inevitable when an app is running and the speakers are at full whack as well.

» **Price** £89.99/$99.99
» **More information** ikmultimedia.com



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edjing Pro

Mixing made easy in this premium DJ app

2 hour wonder

Want your money back? You've got 120 mins to decide!

»0-40 minutes
Most features are accessed via the intuitive interface

»40-80 minutes
A few SoundCloud issues, plus occasional freezes

»80-120 minutes
Some excellent effects, though we'd have liked more

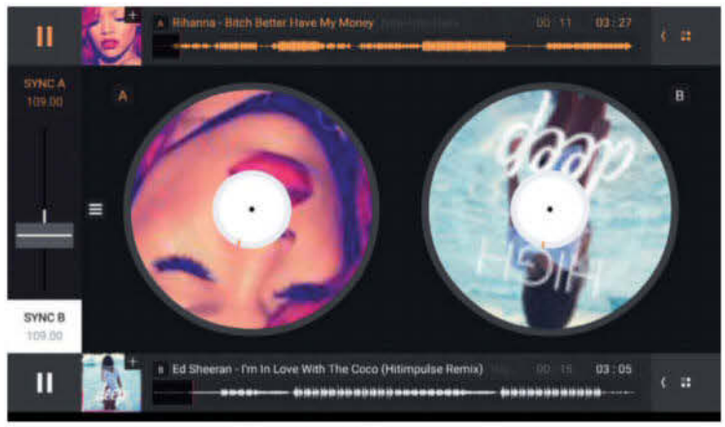
keep refund

The free edjing app has been around since 2012, but now maker DJiT has launched a Pro version. It looks like a completely different app, with a new interface and plenty of extra features – unlike most DJing apps, everything is unlocked from the off (so no IAPs).

The standard view shows scrolling waveforms for the two tracks – loaded from locally stored music, streamed from Deezer (premium account required) or SoundCloud. As in the rival Cross DJ, the latter option is a welcome inclusion, enabling you to search the vast library and browse genres. However, we did experience occasional issues with certain tracks not downloading to the app.

Traditionalists will be glad to see a turntable view option, although it lacks access to some features, including the FX panel. In either view, tapping a track's Sync button will automatically sync it with the other – so long as the BPMs aren't too different. While the automatic beat detection works well, there's a nice option to halve/double the BPM, or even tap it out manually. In waveform view, a Freeze function enables you to pause the waveform scrolling and play slices of the track like a sampler – it works best with synth intros, drum breaks and vocal solos.

What's really neat about the flat-design interface is that the menu bar for each track, at the top and bottom, never obscures the main view. This bar enables you to easily switch between the full waveform, cue points, loops and tempo adjust. There are four colour-coded cue points, while a loop can be set for up to 16 beats – or as low as 1/32. By default, both of these features are auto-synced with the beat, as are effects, although purists can toggle this off in the settings.



Purists can switch to the decks view, although it lacks access to some features

One slight annoyance is that when you tap the FX button for a track, its panel takes up most of the screen on a 7-inch device, so you can't access the other track or do any scratching. However, DJiT informs us that on larger tablets there's a smaller pop-out panel for FX. While we'd have welcomed a greater range of effects, the ones present are high quality. The Shape effects are especially impressive, with touch pads for three slip roll effects and three grid-based ones, the latter jumbling up the order of the beats for some scintillating rhythmic results. Four Colour effects comprise Echo Out, an all-in-one Supafilter, plus standard Reverb and Delay. There's also a four-frequency equaliser.

Additional main options include recording your mix (locally stored tracks only), pre-cueing (using a headphone cable splitter) and an Automix feature for parties. Overall, a neat user interface combined with the auto-syncing of effects, cues and loops makes for great ease of use.

The FX panel offers some cool effects, but takes up most of the screen on smaller devices

»specification

Price **£12.95/$14.99**

Designed for: Phone and tablet
Requires Android: 4.0

»verdict

Performance

Design

Value

Has a few limitations, but it really does make mixing music a cinch

»best free alternative **DJAY 2** » A well-designed DJing app with Spotify integration, plenty of features and easy-to-use controls

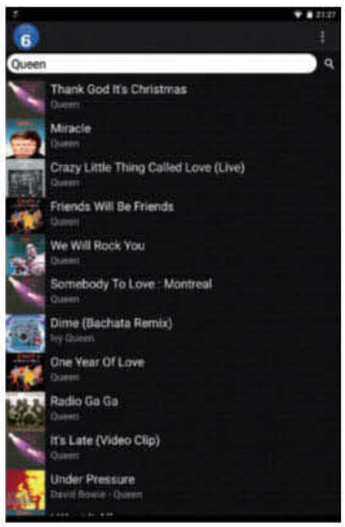
Music Radio - 6 Seconds

An innovative way to listen to music via internet radio

This is the latest creation of digital music entrepreneur Michael Robertson, founder of the original MP3.com streaming service, 6 Seconds. It also claims to be the first free mobile music app to offer unlimited track skips – unlike Spotify and Pandora – along with a search tool.

It works by tapping into internet radio: just search for a track and the app will scan 100,000+ stations and list where it's being played – or if not, which stations are likely to play it soon. Naturally, this works best with recent chart hits or well-known golden oldies. Alternatively, you can search for an artist to view a list of their tracks currently being played; the ones nearer the top are near the beginning – typically within the first six seconds of the song.

Tapping a track takes you to the minimalistic player screen, with album artwork, track and artist details, and radio station. Tapping the art stops the music rather than pausing it, since it's a live stream. Everything else is controlled using gestures. Swiping left takes you to another track from the same genre – not from the last search, as claimed in the app description. Still, it's easy enough to swipe up to return to your search results, or tap the artist name for a list of tracks. Swiping down elicits a list of genres to choose from, along with any favourites currently playing – you can easily favourite tracks and stations (but not artists) by tapping the star next to them on the player screen, making it nice and easy to find them again later.



Search for an artist or song to find it on internet radio; the ones near the top have just started

While lacking some of the features found in more sophisticated radio and music-streaming apps, such as social options, 6 Seconds offers an innovative concept and an intuitive interface that's good for music discovery. There are no annoying adverts every few tracks either, unless you count those you might hear on commercial radio stations.

» specification

Price **Free**

Designed for: Phone and tablet
Requires Android: 4.0

» verdict

A free and innovative way to stream music with unlimited track skips

» like this? try this!

TuneIn Radio
A sophisticated radio app with social features – the paid Pro version lets you record

FreshFeed

Personalised news based on your Facebook Likes

Ever wondered what purpose all your Facebook data serves? Apart from enabling the social network to target you with adverts, of course! FreshFeed: Trending Content employs your Likes to work out your personality to deliver a news feed of content you'll find interesting.

Within a few seconds of giving it access to your Facebook account, FreshFeed generates a feed for you, delivered in an attractive interface with large photos. Swipe up to see more items, or left to switch between tabs for All, Entertainment, Stories and Products. Tapping the arrow icon shows what's trending globally or with Facebook friends. The final icon shows your 'personality wheel', which was accurate in our case, so it was disappointing to find many of the resulting feed stories were of little interest.

» **Price** Free
» **Designed for** Phone and tablet
» **Requires Android** 4.0

» best free alternative **NEWS360** » Personalised news based on your interests, including those on Facebook, Twitter and Google+

Kanvas Keyboard

Send custom photos and GIFs from the keyboard

This replacement keyboard enables you to send custom messages with photos or GIFs. There's a large, searchable library of preset GIFs and stickers to choose from, but the main attraction is customising your photos (or coloured backgrounds) with captions in a variety of fonts, sizes, colours and angles. You can also draw on them. Content is unlocked via virtual coins earned from using this or the Kanvas app. A cool idea.

» **Price** Free + IAP
» **Designed for** Phone and tablet
» **Requires Android** 4.0.3

AudioPocket (Alpha)

Stream audio from YouTube videos

AudioPocket will turn any YouTube video shared to it into an audio stream. This enables you to listen to the music in the background while using other apps. The biggest benefit, however, is the reduced bandwidth required for audio streaming, which means it uses a lot less mobile data than video. The app design is basic but functional. One annoyance is that while you can queue multiple videos, you can't see the play queue – only the history.

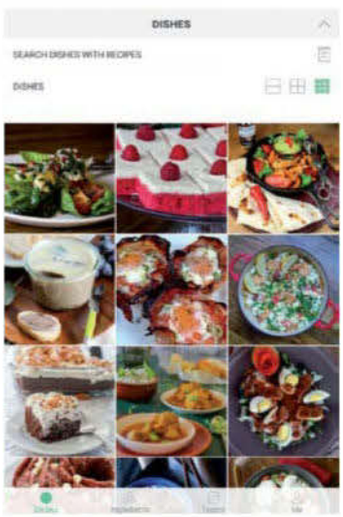
» **Price** Free
» **Designed for** Phone and tablet
» **Requires Android** 4.1

Handpick

Pick ingredients and discover dishes

Sourced from millions of food-related posts on various social networks, blogs and websites, Handpick's curated content helps you to discover quality new recipes. Our mouths were watering upon viewing the photos of delicious dishes on the main screen, which can be filtered to show those only containing recipes. As well as browsing dishes, you can search the database for exactly what you want. The Ingredients tab also helps you find recipes containing any number of items, selected from a list. Simply start typing a name to narrow it down. It'll even suggest what an ingredient pairs well with.

Because the photos aren't labelled, you'll need to tap on one you like the look of to see its name and list of ingredients. Tap the recipe list icon at the top and you'll be taken to it on the source site. Hitting the plus button adds the recipe to your favourites list, arranged into topics, which you can make public so they can be followed in the social Topics section of the app. About the only thing missing is a grocery list feature.



Search for a dish or browse the scrolling selection of photos… yum!

» **Price** Free
» **Designed for** Phone and tablet
» **Requires Android** 4.0.3

VoxelMaker

Create 3D models from building blocks

Building stuff with blocks is undeniably a big part of the fun in Minecraft, and some creative folks have built some truly amazing structures. The VoxelMaker app offers users a way to construct similar 3D pixel-art models from coloured blocks, but makes the process a whole lot easier with a bunch of editing tools and options.

If creating a model from scratch seems too daunting on your first visit, you'll want to play around with modifying the built-in assortment of sample models,

Some impressive sample models tempt you with what can be achieved

including characters, scenes (such as a house interior) and vehicles. The well-thought-out interface has everything you need to hand, via a set of icons in each corner. Four main modes – Draw, Select, Paint and Light Direction – bring up context-sensitive options. In Draw mode, just tap the screen to add a block of the colour selected in the top-left palette (to which you can add shades), or swipe to draw several blocks. Naturally, there's an undo option (essential in the early days), plus delete and toggle/move modes. For more precise control of the cursor, a set of arrow icons comes in very handy. Even with this, editing objects can still prove a little fiddly, though, particularly when trying to select several blocks. You get to control the camera via two-finger swipes and this can be toggled between rotate and move modes.

One thing we soon discovered is that you can only build blocks within the canvas area. Although that doesn't seem like such a big thing, it took us a while to find the Resize option (under the right-hand disk icon menu). Other than that, it proved fairly intuitive to start building and get creative. The ability to move and copy sections, which can be mirrored and rotated, helps to speed things up, as does the ability to render 3D versions of typed-in text. It's even possible to insert one model within another, ideal for placing characters in a scene. Finished models can be exported in several file formats.

Just type in some text and it'll instantly be rendered in 3D blocks

reTXT

Change and delete your sent messages

Ever sent someone an instant message only to then instantly regret it? If this is something you do more than you'd like, you'll do doubt be interested to hear that the standout feature of reTXT is the ability to alter or delete any messages you've sent, simply by tapping the pen or minus icon next to them.

After signing up for the service, via text or email verification code, you arrive at a mainly blank screen, which will eventually show all your conversations. Note that you can only message other reTXT users, on Android or iOS, so you'll probably need to invite some friends before you can begin. In addition to altering your own messages, you can swipe right to ask for clarification on someone else's, which saves time. Another welcome addition is the ability to leave group chats and return later. One slight downside is that after the first 60 days, you'll need to pay a $0.99 annual fee.

» **Price** Free + IAP
» **Designed for** Phone and tablet
» **Requires Android** 4.0.3

Oops! Tap the pen icon to correct a message that has already been sent

» like this? try this! **CONFIDE** » Send self-destructing, screenshot-proof messages to help protect your privacy from snoopers

The copy/paste and rotate options help to speed up your building

»specification

Price **£3.95/$4.99**

Designed for Phone and tablet
Requires Android 2.3

»verdict

Performance

Design

Value

The app is a bit fiddly to control, but it's a lot of fun building things from blocks

2 hour wonder

Want your money back? You've got 2 hours to decide!

»0-40 minutes It's not immediately obvious what all the icons are for

»40-80 minutes The cursor arrows come in very handy for precise control!

»80-120 minutes The ability to quickly render text saves a lot of hard work

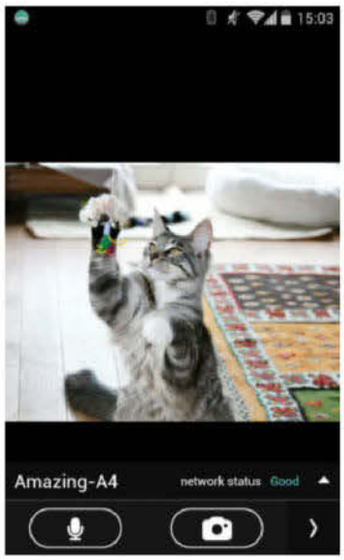
keep refund

»like this? try this!

Spacedraw A fully featured CAD-style tool for creating wireframe models and rendering them

Alfred

Keep an eye on what is happening at home when you are away



One nice feature is the ability to rename each camera to suit its location

Alfred offers a free alternative to dedicated security cameras. It links two devices via your Google account – one is the camera, the other is the viewer. You can even have multiple cameras in different rooms.

It's easy to set up and you'll soon be monitoring the live camera view remotely. The video quality is adjusted for network speed, so there's little lag and while our frame rate was low – around 10fps – it proved adequate. We did encounter an upside-down view, but there's an option to rotate it, as well as for LED light on/off, front/rear camera and night mode. A mic button lets you talk through the camera's speaker, to deter an intruder or talk to your child if using as a baby monitor.

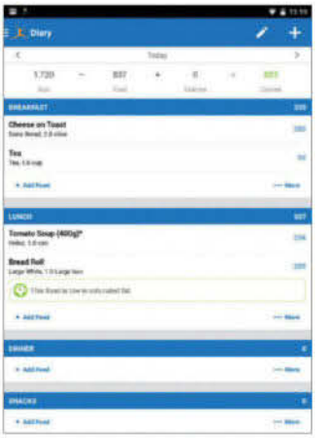
Alfred's killer feature is motion detection, which works really well, taking a series of photos and sending an alert to the viewer device. The only thing missing from the features is a video recording option.

»Price Free
»Designed for Phone
»Requires Android Varies

»like this? try this! **ATHOME CAMERA – HOME SECURITY** »A security camera app which also works with PCs and offers timed video recordings

quickhits

5 top apps for... Health and fitness



Calorie Counter – MyFitnessPal
Free + IAPs

Set a target weight and use the app's vast database of foods to count the calories (and nutrients) of everything you eat, plus any burnt off by exercise. An amazing amount of analytic detail.

RunKeeper – GPS Track Run Walk Free + IAPs

Also compatible with GPS Android Wear smartwatches, it tracks your runs and other activities, shown on a customisable dashboard. It syncs with many other apps and you can compare your runs with friends.

Google Fit Free

Google Fit acts as a useful hub for other fitness apps, so you can view all your data in one place, along with the suggested goals. It can also be used by itself to track your walking, running and cycling.

The Walk: Fitness Tracker Game
£2.39/$2.99

This app offers an audiobook-style interactive story to motivate you to get walking. Your real-life steps move you along a map to unlock clips and clues.

Sleep Better with Runtastic
Free + IAPs

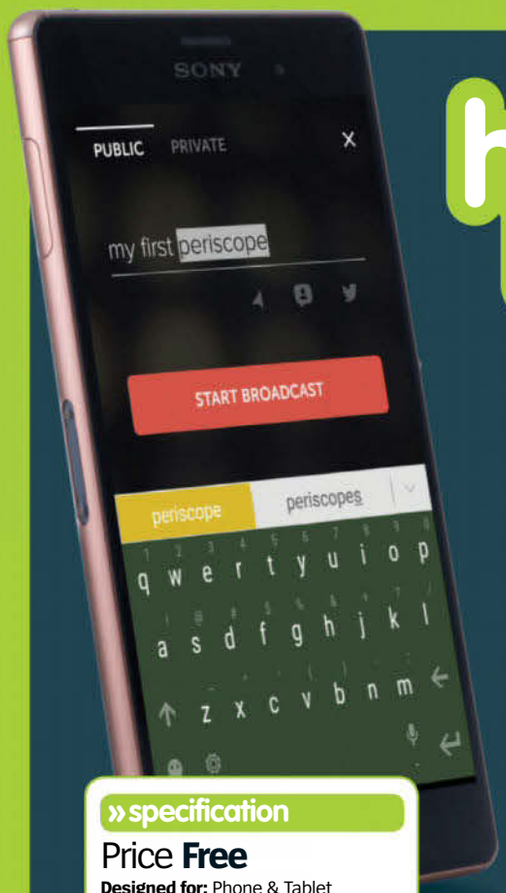
Place your phone by your pillow at night and Sleep Better will analyse your sleep patterns and provide insights on how they're affected by factors such as alcohol and caffeine. Fascinating stuff.

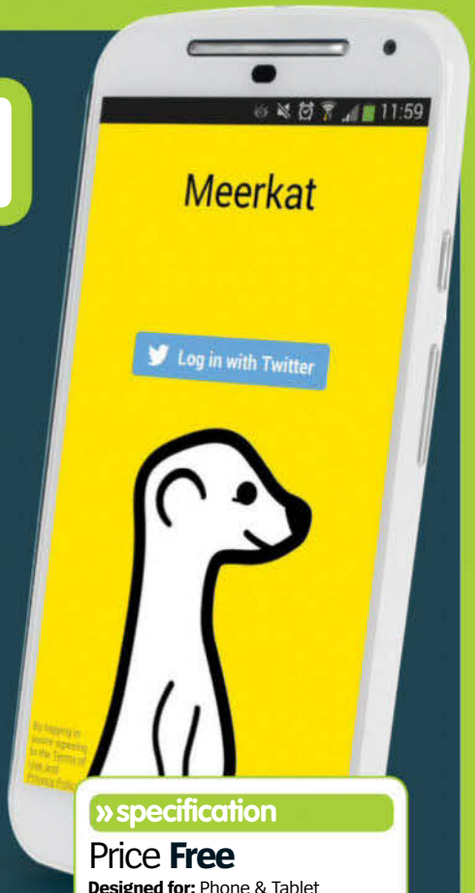
head to head

We pit two of the hottest new social media apps against one another

PERISCOPE VS MEERKAT

Periscope and Meerkat are rival apps that allow you to broadcast live video from your phone and share it via Twitter. Periscope is an Twitter's official product, while Meerkat is a third-party rival, but which one does it better?





»specification

Price **Free**

Designed for: Phone & Tablet

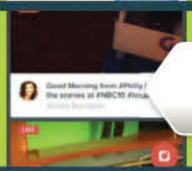
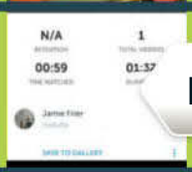
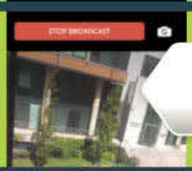
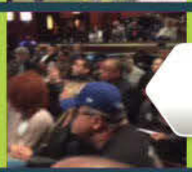
Requires Android: 4.4

»specification

Price **Free**

Designed for: Phone & Tablet

Requires Android: 4.3

Periscope		Meerkat
LOSE — Set up for Periscope takes a little bit longer than its rival but is still up and running reasonably quickly. The extra step is finding your friends to connect, which takes up time.	**SET UP**	With Meerkat you can go from downloading the app to creating your first stream in a matter of minutes with very minimal and quick set up. — WIN
WIN — Although it involves slightly more navigation than Meerkat, Periscope is much better laid out with separate menus for your videos and those of others.	 **DESIGN**	Meerkat is set up very simply for users to create their Meerkast, but it's not as easy to find your friends through the app as Periscope. — LOSE
DRAW — If someone likes your video they can send you hearts, which propel you up the 'Most Loved' list. You can also save your broadcasts for up to 24 hours, which is useful.	 **EXTRA FEATURES**	With Meerkat you can like and retweet video streams. You can also comment on streams as they are happening, so the Meerkaster can see and respond with speed. — DRAW
DRAW — Although the streaming speed and quality is very high on Periscope, it isn't so easy to respond to the viewers via text, which is a real let down.	 **EASE OF STREAMING**	Streaming is easy enough and is very similar to sending a tweet so there is not much to get the hang of. You can write on your own stream too, which is cool. — DRAW
WIN — Watching a stream is really easy to do and the screen is clear of too many distractions, apart from the number of floating hearts that are in the corner.	 **WATCHING A STREAM**	It is easy to pick up on a friend's stream and also watch 'Meerkasts' by top ranked users. The profile pictures along the top are poorly placed though. — LOSE

And the winner is... PERISCOPE

The differences between each app are minimal but Periscope just takes it. The ability to find your friends' streams and the clean layout of those videos are better in Periscope. Although Meerkat's simplicity appeals, Twitter's own app feels like a more complete product.

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Broken Age

A game of two halves

Originally split into two acts on PC, but reunited on Android, Broken Age is far from your average point-and-click affair. This captivating piece of interactive fiction starts off as two separate adventures in unrelated settings, starring two teenage protagonists whom you can switch between at will, yet you immediately have a deep inkling that their stories must surely be linked in some way.

In the idyllic village of Sweet Bunting, Vella is about to have the honour of participating in the Maidens Feast; this, it turns out, involves being sacrificed to a giant monster called Mog Chothra, which must be fed to appease it. There's plenty of witty dialogue and dark humour, including young maidens desperately trying to outdo each other to make themselves more alluring to the hungry Mog. However, the rebellious Vella manages to escape its slavering jaws and soon finds herself in a village in the clouds,

Access items in the inventory and switch to the other character at any point

The mysterious Marek asks Shay to rescue creatures using a robot arm

led by an 'enlightenment' guru (voiced by Jack Black), which forms the basis for countless jokes. Meanwhile, Shay (Elijah Wood) is bored to death with his solitary life aboard a spaceship, stifled by overprotective virtual parents. There are shades of *The Truman Show* in this fake, sanitised setting, as well as *Groundhog Day* as he's forced to repeatedly complete phony, childish missions such as rescuing cute knitted 'yarn pals' from an ice-cream avalanche and a runaway train. All of this changes when he manages to break out of the cycle and encounters the mysterious Marek in the bowels of the ship; dressed in a wolf suit, this strange character encourages Shay to hack into the ship's systems and complete missions to rescue creatures.

All isn't necessarily as it seems, however, and there are some excellent twists (including one amusing red herring), culminating in the two worlds of the protagonists colliding at the halfway point. Admittedly, following this denouement, the second act isn't quite so enthralling, partly due to some recycling of locations and characters. There are also some rather obscure puzzles to solve, which may well prove frustrating. However, the overall experience of Broken Age is a highly memorable one with plenty of LOL and WTF moments, so it's definitely a game well worth persevering with.

» **Price** £7.86/$9.99
» **Designed for** Phone and tablet
» **Requires Android** 4.1

what we've been playing

Dragon Hills
Free + IAPs
The sheer fun of wreaking havoc on a kingdom with a fearsome dragon keeps luring us back for another go. Part of the appeal lies in continually upgrading its abilities and power-ups.

Joe Danger
£2.29/$2.86
The fun-filled motorbiking mayhem gets our throttle revving every time. We're still trying to get all the medals on the 80 obstacle courses and we won't stop until we succeed. It's so addictive.

Recommend a game...
» twitter
@lgrobot

Mortal Kombat X

Who ripped its brain out?

Mortal Kombat has always been notorious for its gore, but it also featured skilful beat-'em-up gameplay. Fighting to the death involves tapping to attack and holding with two fingers to block. Occasionally, you'll get an instruction to swipe to perform a blood-splattering combo, for which you're given ample time. You can also unleash the special moves that are gradually built up during a fight and tag in another team member or guest ally.

Follow the occasional on-screen swipe instruction to execute a combo

One disappointment is that you mainly get to battle anonymous goons who fight in a similar way, with only the rare familiar opponent. At least the freemium aspect isn't too overbearing as you gradually upgrade your fighters' skills using cards, although energy is required for each and every battle.

» **Price** Free + IAPs
» **Designed for** Phone and tablet
» **Requires Android** 4.0

Marvel Future Fight

A marvellous and heroic action-RPG

Assemble a three-man team of superheroes in this epic RPG with an original story about a collapsing multiverse. It'll take quite a while to unlock the characters (nearly 40 in total), each of whom has their own powers that may prove advantageous. While various IAP currency bundles are available to speed things along, it's possible to progress without them. Each mission does cost energy, but you're given a generous supply before waiting to recharge it.

The gameplay has a standard structure – you take on enemies in each zone before progressing to the next, culminating in a boss battle. You can switch between heroes at will to make use of their special powers, which are limited by cool-down timers – as is the powerful multi-hero attack.

Captain America unleashes a special shield attack against a boss

An engaging experience with long-term appeal, Future Fight one of the better Marvel mobile games.

» **Price** Free + IAPs
» **Designed for** Phone and tablet
» **Requires Android** 3.0

Indefinite: Interrogation Game

How long can you keep it up?

Following a catastrophic global event, you've been brought in for questioning. The aim of this bizarre game – with ultra-minimalistic presentation – is to answer as many multiple-choice questions as you can. The twist is that you choose what answer to give, but must then give an identical response the next time you're asked. It therefore amounts to a test of memory and with the timer rapidly ticking down for each question, you can feel quite panicky. Get an answer wrong, or take too long, and it's game over.

Answer however you like, but make sure you are consistent or you'll be rumbled

While it gives you an idea of what it might feel like to be interrogated, with spooky music adding to the air of menace, there's not actually an awful lot to it and the novelty wears off after a few goes.

» **Price** Free + IAPs
» **Designed for** Phone
» **Requires Android** 2.3

The Firm

Buy! Buy!… No wait, sell!

Based in the world of high finance, The Firm offers fast-paced twitch gameplay. You simply swipe left or right to sell or buy each stock, based on its graph. On green charts, you need to buy rising stocks and sell falling ones; however, the rules are reversed for red charts. Special reports also need to be tapped and swiped. It's a real test of mental agility against the clock. If your stack of papers reaches the top, or you make too many mistakes, you get fired. While this is inevitable, you continue as a new trader the next day. Promotions are gained upon reaching certain profit levels; money can also be spent on helpful power-ups. The gameplay also gets trickier with the addition of papers without charts – for these, you have to memorise newspaper reports about which stocks to buy and sell. This helps mean that the gameplay is not quite as shallow as it first seems.

Swipe a series of stocks correctly to increase the score multiplier

» **Price** £0.84/$0.99
» **Designed for** Phone and tablet
» **Requires Android** 2.3

quickhits

Addictive gaming

Earn to Die 2
Free + IAPs
Featuring a longer story mode and new city setting, it has the same premise as before: drive through hordes of zombies to survive! Unoriginal and repetitive, yet fun to pick up and play.

Wings Remastered
£4.29/$4.99
Fully remastered from the 1990 Amiga game, this WWI aerial combat classic features three mission types: strafing and bombing runs, plus excellent first-person-view dogfights. Chocks away!

Grim Fandango Remastered
£7.87/$9.99
Double Fine's revamped version of its 1998 PC epic adventure features some seriously tough puzzles – and no item highlight function to help! It's well worth persevering with, though.

Goat Simulator GoatZ
£3.99/$4.99
Rather than just causing mayhem, this fun sequel sees your goat trying to survive a zombie attack! New elements include item crafting and even driving a car, but the bugs can be frustrating.

TinyKeep £3.99/$4.99
Best played on higher-spec Tegra-powered devices, TinyKeep features randomly generated 3D dungeons to explore, with the prospect of permadeath at every turn. It's hugely challenging but absorbing.

Spirit Lords Free + IAPs
In this spooky action-RPG, you collect the spirits of the dead – via a sub-game – and then use their powers in battle. This is best played on a larger screen, and features some decent combat and multiplayer.

Does not Commute

Just try not to crash into yourself!

This game sees you driving every vehicle on the road. Well, you control each one in turn – using on-screen buttons to steer – and take it to the required destination on the map. Its journey, exactly how you drove it, is then repeated when you drive the next car. So you end up having to keep clear of the vehicles you've already driven. Crashing into them, or scenery, wastes precious seconds – there's an overall time limit to complete all the journeys in each stage. A rewind option is handy, as are upgrades such as turbo.

The bird's eye view features nicely rendered vehicles, crash effects, weather and headlights. The amusing stories of the characters also add to the fun, as you gradually discover what they get up to.

While the game is free to download and ad-free, an IAP ((£1.60/$1.99) unlocks the ability to continue from checkpoints. With only seven levels, it is a bit short, but you'll certainly enjoy the ride.

Get each vehicle to its destination, while avoiding those you've already steered

» **Price** Free + IAPs
» **Designed for** Phone and tablet
» **Requires Android** 2.3

Plunder Pirates

Ahoy there me hearties, here be treasure!

Launched on iOS last year, Midoki's seafaring strategy MMO has finally landed on Android shores. It plays identically and you can even continue your existing iOS game on Android by entering a special code – a nice touch for those who are juggling devices.

Plunder Pirates offers a well-balanced combination of resource building, maritime exploration and good-old-fashioned plundering of rival bases. The early focus is on building up your island base, unlocking new structures and upgrading your defences and attacking capabilities. Key to all of this action is the production of gold and grog, from mines and distilleries respectively. The third currency in the Plunder Pirates universe is gems; these are more difficult to source, found occasionally while seafaring or earned via certain achievements.

Fortunately, while IAP bundles are available to speed up things such as building, the freemium aspect never becomes overbearing. Indeed, you can play the game perfectly happily without ever needing to shell out any of your real gold.

Merrily sailing around the high seas is the other main part of the game. Your ship's crew is recruited from the tavern; the pirates come in various types and can be trained up in order to give them special powers for when you are in battle. In addition to attacking all of the AI bases on the map, you can act like a real pirate and plunder those of other players to earn gold and grog. You only get three minutes to mount your attack, with a bonus earned for achieving 100% destruction. Naturally, this means that your own base may be targeted by others, so an essential part of the gameplay is to build some serious defences such as cannons, mines and walls.

A friendlier aspect is the guild system, enabling you to team up with other players to chat, gain bonus perks and battle rival guilds in the newly added rumbles. It adds an extra facet to a fun, compulsive experience with a decent amount of strategy. The only slight, but obviously necessary, downside is the inability to play it offline.

Build up your island base, unlocking new structures and defences

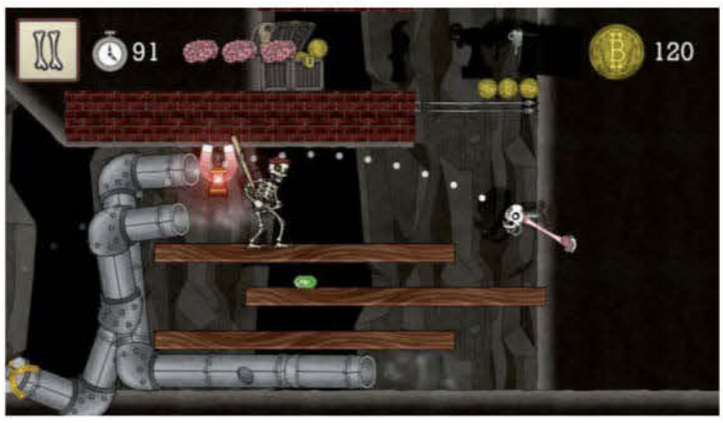
Skullduggery!

A delightful brain-stretching puzzle platformer

Working as a tax collector in the afterlife, you need to collect coins and other valuables. Bizarrely, this involves pulling back your stretchy brain to catapult your skull around the scrolling levels. Enemies can be smashed, best done with a head-shot, and their brain stolen for an extra life. You can even sneak up behind foes by hiding in chests and trash cans. Other hazards include cannons, a sliding wall of death and some giant bosses. To help you out, long-pressing results in a Bullet Time-style slowdown, for changing direction in midair. While somewhat repetitive, the game's light-hearted appeal is prolonged by secondary objectives. An IAP (£2.35/$2.99) removes ads and unlocks a split-screen two-player mode.

» **Price** Free + IAPs
» **Designed for** Phone and tablet
» **Requires Android** 3.0

Sneak up behind this enemy skeleton to avoid being batted away



»specification

Price **Free + IAPs**

Designed for Phone and tablet

Requires Android 4.0.3

»verdict

Performance

Design

Value

You'll soon be hooked and eager to discover some hidden depths

2 hour wonder

Want your money back? You've got 2 hours to decide!

»0-40 minutes Building up your island base is a satisfying experience

»40-80 minutes Plundering a rival pirate's base is great fun

»80-120 minutes There's definitely more to the game than first meets the eye

keep refund

Sail uncharted waters to discover new places, battling ships and sea monsters

»like this? try this!

Clash of Clans

The original mobile strategy management MMO, is still great fun to play today

LEGO Star Wars TCS

May the Force be with you… at last

TCS stands for 'The Complete Saga' and that's what this epic game offers: all six episodes and over 120 characters to unlock. It's a conversion of the classic console games created long, long ago (2005-6), which arrived on iOS back in 2013. Why it's taken so long to appear on Android is a mystery, but it's still very playable. There are some complex puzzles to solve, plus precision platform jumping. The latter can prove frustrating due to imprecise touch controls, so an external Bluetooth controller is definitely recommended.

Starting off in the Mos Eisley Cantina, you can practise all the moves – including deflecting shots with your lightsaber and using the Force on items – before heading through the Episode I gate. Each episode comprises six levels, and replay value is boosted by secret areas to unlock later with new characters. The presentation is polished, with some brilliant cut-scenes, while the stud-collecting and brick-building LEGO gameplay is familiar but fun.

Switch between characters and get busy with that lightsaber

»Price £4.22/$6.99

»Designed for Phone and tablet

»Requires Android 4.0

»like this? try this! **STAR WARS REBELS: MISSIONS** »Pilot vehicles, wield a lightsaber and battle bosses in this polished platform shooter

quickhits

5 top games for... Brain-boggling puzzles

The Room Two

£1.99/$2.99

Improving on the award-winning original, the more expansive sequel soon draws you into its dark, atmospheric world. Fiendish, multilayered puzzles require lots of poking, prodding and lever pulling.

Monument Valley £2.99/$3.99

Inspired by MC Escher's famous 'impossible reality' art, this isometric 3D puzzler forces you to think laterally as you visually 'connect' pathways so that your character can move between them.

Trainyard

£1.99/$2.99

This classic brain-boggler sees you placing tracks to guide trains to colour-coded stations, sometimes needing to merge them or blend their colours. The tougher levels may well end up driving you loco!

World of Goo

£2.99/$4.99

A golden oldie to tax your logic and patience, it has you building bridges and other structures from gooey balls – some with special properties – to get enough of them to each level exit.

Tiny Thief

Free + IAPs

Rovio's Robin Hood concept sees the eponymous hero stealing treasure from the rich. You'll definitely need all your cunning to outsmart enemies, solve fiendish puzzles and unlock all the tasty bonus rewards.

Android magazine

BUYER'S GUIDE

Discover the best smartphones, tablets and accessories to buy in our top ten charts

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TOP 10 SUPER SMARTPHONES

THE BEST FLAGSHIP AND MID-RANGE ANDROID PHONES ON THE MARKET

1		**Samsung Galaxy S6** Samsung has come out of fighting after the humdrum response to the S5, with this stunning handset made entirely of metal and glass. Samsung has had to sacrifice microSD support and removable battery to make it so thin and light to hold, but it offers a 13MP camera, wireless and superfast charging, improved fingerprint scanner and benchmark-beating processor instead.	£559 See issue 52	
2		**LG G4** The LG G4 is a close second for the phone of the year behind the Galaxy S6, with a distinctive leather-back case and superior camera. Its unique Quantum IPS screen will amaze with images that are bright and crisp and offer vivid colours, while its 2TB microSD port offers lots of extra storage.	£519.99 See issue 52	
3		**Sony Xperia Z3** Artfully crafted from glass and metal, the Z3 is not just stylish, it's also 100 per cent waterproof. Its 20.7MP camera is one of the most powerful we've seen and the PlayStation Remote Play feature will appeal to gamers. The launch of the Xperia Z3+ is also set to bring down the price of this older model.	£499 See issue 44	
4		**HTC ONE M9** We marked the M9 down for only being a very minor update on the M8, but it is undeniably a superb phone. Underneath its elegant silver and gold chrome shell, it houses a superfast Snapdragon 810 processor, 20MP camera, 3GB RAM, 32GB memory and some clever customisation tools.	£579.99 See issue 50	
5		**Moto X (2014)** The second-gen Moto X remains a contender for best phone, despite launching last year. It offers a stock Android experience with a 13MP camera, 15-minute Turbo charging, but is much cheaper than the Nexus 6, which has the same features. Its other specs are starting to look a bit dated though.	£395 See issue 45	
6		**Nexus 6** Google's first phablet, the Nexus 6 is larger than either a Galaxy Note 4 or OnePlus One. This can make it an awkward fit for one-handed use, but the gigantic 5.9-inch QHD display looks fantastic. It also has a super-fast processor and 3GB RAM for zippy use, along with a commendable 13MP camera.	£499 See issue 47	
7		**LG G3** Though its been superseded by the G4, the LG G3 continues to impress us with its pin-sharp QHD 5.5-inch screen, laser-focused 13MP camera and lightning-fast processor. However, its faux metal plastic casing is no comparison for the G4's leather back, and its mono speaker is disappointing.	£276.99 See issue 41	
8		**HTC One (M8)** While the M9 has bumped the M8 down a peg in our chart, it remains a fantastic phone. An all-aluminium design, with a bright 1080p screen and critically-acclaimed dual BoomSound speakers. Not only has its price slashed with the launch of the M9, it can be upgraded to Android 5.0 as well.	£336.99 See issue 37	
9		**Samsung Galaxy Note 4** To look at, the Note 4 is a modest update on the Note 3, with a same-size display and continued emphasis on using the S Pen stylus. However, it has been revamped in almost every area. The TouchWiz interface handles better than ever, it has a 16MP camera and has an extra-long battery life.	£599 See issue 45	
10		**Honor 6 Plus** Quite literally the bigger brother of the Honor 6, this phablet upgrades the display from 5-inches to 5.5-inches, adds a 13MP rear camera, a faster processor, bigger battery and more storage. However, it only runs Android 4.4 out of the box, which is heavily skinned with a rather clunky interface.	£249.99 See issue 53	NEW ENTRY

In case you missed it... Festival essentials Read more in issue 52

Cobra MT975 PMR 2 Way Radios

» **Price** £69.99/$TBC
» **Website** maplin.co.uk

Most music festivals take place in fields, so phone signal isn't guaranteed. These walkie talkies cover wide distances and include 121 different radio channels.

iWalk Extreme TRIO1000 Backup Battery

» **Price** £64.99/$89.99
» **Website** iwalkuk.com

It's no good keeping your phone charged if your festival buddy's handset is flat. This 10,000mAh battery pack lets you charge up to three devices at once.

Lava BrightSounds Portable Bluetooth Speaker

» **Price** £39.99/$TBC
» **Website** amazon.co.uk

This Bluetooth speaker will keep the festival fun going after the headline acts finish their third encore. A built-in flashlight also ensures you can party all night!

WINNER Cobra JumPack

» **Price** £79.99/$149.95
» **Website** argos.co.uk

Walking back to the festival car park, you realise you left your headlights on all weekend. Never fear! This giant 7,500mAh battery pack can even jump start your car!

Buyer's Guide

TOP 10 BUDGET BUYS

IF YOU'RE SHOPPING FOR A SMARTPHONE ON A SHOESTRING, CHECK OUT THESE LOW-COST MOBILE MUST-HAVES

1		**ZTE Blade S6** While its price puts it at the top-end of what we would call a 'budget phone,' the Blade S6 is the best ZTE Blade in years. It runs Android Lollipop, has a 64-bit Snapdragon processor, 2GB RAM and the exact same IMX214 camera as the Sony Xperia Z3 – which costs around three times as much! Its overall iPhone-inspired design is a bit boring, but at 7.7mm, it is a surprisingly slender handset.	From £169.99 See issue 50	
2		**Moto G 4G (2015)** The third generation of the Moto G 4G, it is the same shape and size of the Moto X (2014), with a 5-inch screen, booming dual speakers and customisable rear case. As well as offering 4G connectivity, it is packing an 8MP rear camera, near stock Android 5.0 and boosted 2390mAh battery.	£149.99 See issue 51	
3		**Moto G (2014)** If superfast 4G connectivity isn't a priority for you, the Moto G offers many of the same features as the Moto G 4G (2015) but for slightly less money, including the camera, speakers and option to upgrade to Android 5.0. It also includes a Snapdragon 400 quad-core and dual-SIM support.	£140 See issue 44	
4		**Moto E (2014)** Available for under £100, SIM-free and no contract, the Moto E is the ultimate no-strings-attached smartphone. With a sturdy, splashproof case, 1980mAh battery that will go the distance and microSD slot to expand the tiny 1GB memory, the Moto E is an impressive build that won't break the bank.	£69 See issue 40	
5		**Asus ZenFone 5** While it is one of the most expensive phones in our budget buys chart, the ZenFone 5 offers an awful lot for less than most mid-range phones. A stylish metal design is available in a range of colours, it has a sharp 5-inch screen, powerful Intel Atom processor, and 8MP shooter with a range of modes.	£142.17 See issue 48	
6		**Sony Xperia M2 Aqua** Just like Sony's flagship Xperia Z3, this mid-range marvel is waterproof up to at least 1.5 metres. Sony's other top feature is here as well, with an 8MP rear camera and a suite of photography tools. The only downside is that, after you factor in all the preloaded apps, it only has 4GBs of storage.	£125 See issue 48	
7		**Honor Holly** The low-end alternative to the Honor 6, the Holly manages to offer 16GB storage, an 8MP camera, a five-inch HD screen and dual-SIM with only a double-digit price tag. However, you get what you pay for, as the build quality feels quite cheap and it only runs Android 4.4.	£89.99 See issue 50	
8		**HTC Desire 510** At 4.7-inches, with a budget price tag and LTE connectivity, this is HTC's answer to the Moto G 4G. However, cost-saving measures such as a 5MP camera and poor screen quality, mean it just can't compete. HTC's Sense 6 UI is still here though, offering one of the best custom interfaces for Android.	£155.99 See issue 44	
9		**Samsung Galaxy Ace 3** While Samsung's high-end handsets get a lot of attention, the company has a much broader range. The Galaxy Ace 3 has been superseded by the Ace 4 now, so we might have hoped the price might have dropped further, but it still offers a few impressive features, including 64GB microSD support.	£97.69 See issue 34	
10		**Honor 3C** This frugal 5-inch phablet is a bit behind the times running Android Jellybean and only offering 3G signal and 8GB storage. However, a 2MP front-facing selfie camera, generous 2GB RAM, expandable memory and dual-SIM support help to make this a great phone for first-time users.	£109 See issue 49	

In case you missed it... TV quiz games

Read more in issue 51

Catchphrase 2015

» **Price** Free + IAPs

This free download is good, but it's not right. Actually this Android adaptation isn't bad. As on the TV show, you have to identify a phrase shown by each cartoon animation. But instead of typing the answer, you assemble the answer from a word jumble.

Pointless Quiz

» **Price** £1.49/$2.49 + IAPs

While missing the comical banter between the TV show hosts, this app nicely adapts the show for mobile. Guess the most obscure answer to score the least high score and stay in the game. Play against an AI or challenge Facebook friends.

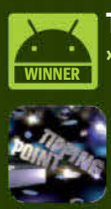
The Chase

» **Price** £1.49/$2.31 + IAPs

Take on the mighty minds of The Beast and co in this battle of knowledge. It follows the format of the TV show, culminating in the tense Final Chase. As an added bonus, up to four players can play on one device for offline fun.

Tipping Point

» **Price** £1.49/$2.46 + IAPs



What might seem like a daft idea for a TV show works well as a mobile game. Answering quiz questions is secondary to the business of playing a giant coin-dozer machine.

TOP 10 BEST TABLETS

WHETHER YOU'RE LOOKING FOR A SEVEN OR TEN-INCH DISPLAY, THESE ARE THE TOP TABLETS AVAILABLE ON ANDROID

1		**Sony Xperia Z3 Tablet Compact** With its 8-inch screen and premium price tag, Sony is pitching the Z3 squarely against the iPad mini in a bid to compete with its rivals. Weighing just 270g, it is slim and slender with a stylish minimalist design that belies the blazing processor and 3GB RAM under the hood. Its Triluminos display can give Samsung's Super AMOLED screens a run for their money and works fantastically with Sony's PS4 Remote Play feature so you can enjoy console-quality games on the go.	From £269 See issue 46	
2		**Google Nexus 9** A mighty Nvidia Tegra K1 processor and 3GB RAM mean that even running the most graphic-heavy games won't slow this 64-bit tablet down. The built-in BoomSound speakers also offer great sound quality, making Google's new tablet an all-round media consumption device.	From £319 See issue 45	
3		**Samsung Galaxy Tab S 10.5** Ultra thin and ultra bright, colours look vibrant and details distinct on this powerful Super AMOLED screen. Samsung's iPad slayer also puts many other Android tablets to shame, with a multi-window mode to display several apps at once and octo-core processor ensuring lightning-fast performance.	£399 See issue 43	
4		**Sony Xperia Z2 Tablet** Arguably one of the most portable 10-inch tablets available, the Xperia Z2 Tablet is waterproof and can support a SIM card for 4G use. It is also surprisingly thin and light to carry, and includes power-saving modes to ensure longer battery life. Reasonably high-spec, it has a whopping 3GB RAM.	£329 See issue 39	
5		**Tesco Hudl 2** This sequel to the supermarket chain's own-brand tablet can't compete with premium models, but sets a new benchmark for budget tablets. Upping the display size from 7 to 8.3-inches, the Hudl 2 also runs Android 4.4.2 KitKat and can handle anything you throw at it thanks to an Intel Atom processor.	£99 See issue 44	
6		**LG G Pad 8.3** A well-rounded tablet, the LG G Pad 8.3 offers solid specs with a selection of impressive built-in apps. These include Polaris Office so you can write documents on the go, and QPair, which shares your smartphone notifications to your tablet so you never miss important updates.	£249.99 See issue 40	
7		**Samsung Galaxy TabPRO 8.4 Wi-Fi** The smallest tablet in Samsung's collection, the TabPRO 8.4 proves that good things do come in small packages. A stunning 359ppi screen puts the Nexus 7 to shame, though we'd prefer higher-quality speakers. However, an 8MP camera and intuitive interface are good compensation.	£199 See issue 38	
8		**Archos 101 Oxygen** This wedge-shaped tablet is seemingly tilted to give you a better angle for watching videos, plus a mini-HDMI port to connect it to your TV. But we're not sure why as it has a spacious 10-inch screen of its own, with full HD display and good viewing angles. Speedy ARM Cortex A17 CPU is a bonus though.	£169.99 See issue 38	
9		**Alcatel ONETOUCH Pixi 7** This 7-inch tablet can't be faulted for its price, which is one of the most affordable on the market. It runs Android KitKat 4.4, offers 1080p video playback and has a triple-core processor. It's also incredibly lightweight for added portability, but lacks memory with only 4GB RAM.	£64.99 See issue 48	
10		**Amazon Fire HD6** Despite only having a 6-inch display and a budget price tag, the Fire HD6 is a decent tablet for watching movies and listening to music. However, the inferior forked OS and lack of third-party app support make the Fire HD6 hard to recommended for regular, let alone heavy-duty use.	£79 See issue 46	

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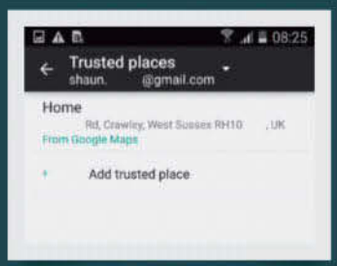
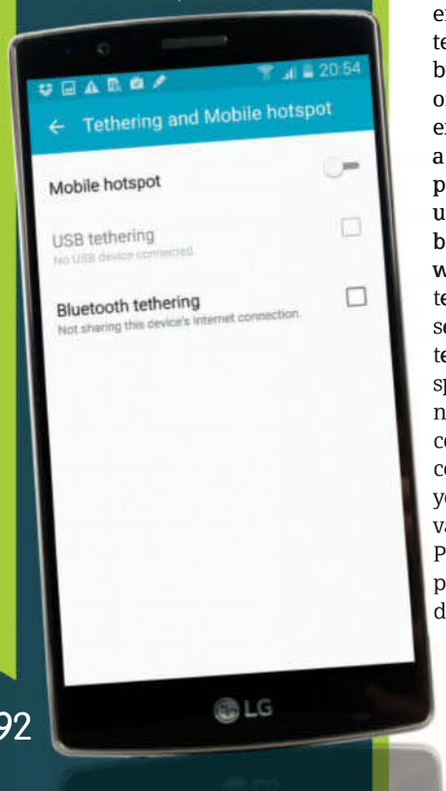


Did you know?

If you are running Android Lollipop, go to Settings>Security and look for the Trust agents section. Here you can add locations where your device will unlock automatically, such as home. Make sure you only choose very secure places where others cannot use your device.



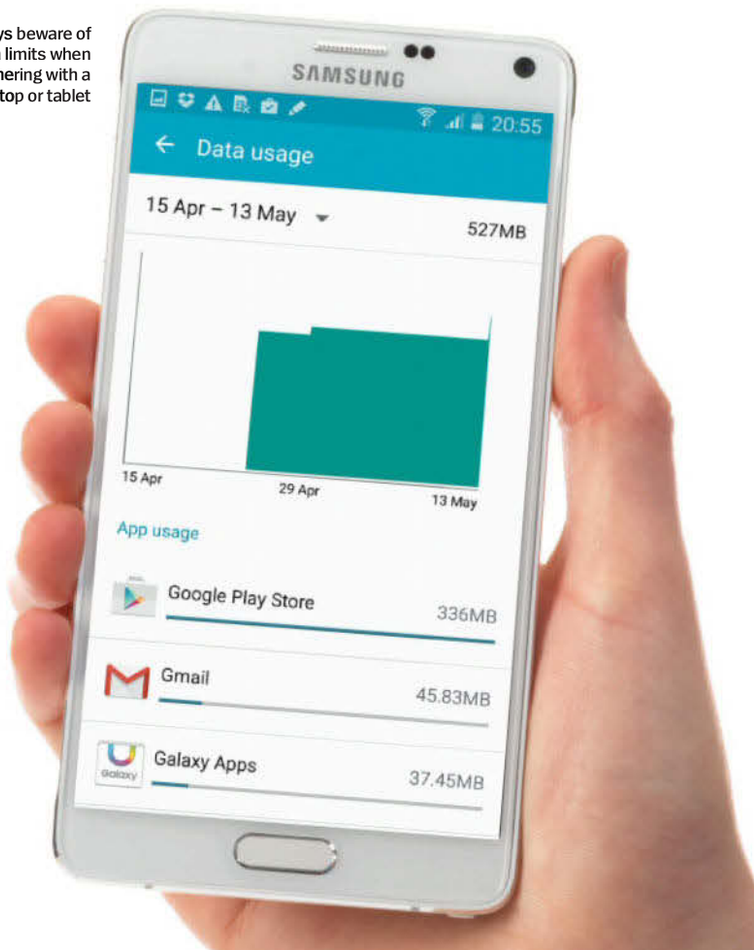
How safe is it to tether my Android?

"Is it safe for me to use my Android phone's internet connection with my laptop. I would like to be able to work from anywhere, but am concerned about the speed, reliability and data allowances. Also, is 3G more secure than public Wi-Fi?"

Bernadette Lewis

A **Hi Bernadette.** Tethering is a great use of any Android phone if you make sure that you have all of the bases covered before you start. We will cover the question of security first and after some research, we would say that 3G and 4G are generally safer ways to connect to the internet when mobile than public Wi-Fi networks. Many types of encrypted networking technology have been hacked, but to do so over 3G requires a lot of motivation, considerable expense and the ability to strike a potentially moving target. With public Wi-Fi, and in particular unsecured networks, this process becomes easier and that is why we give the edge to mobile technology in terms of how secure it is. Wi-Fi networks do tend to offer a more consistent speed, but if your mobile network is offering a fast enough connection, even a drop of 30 per cent in speed should not slow you down, but of course signals vary depending upon location. Perhaps the most important point to consider, however, is the data allowance that you have attached to your mobile contract. It is extremely easy to run up heavy usage when tethering with a laptop or even a tablet, so please check the exact terms of your contract before you start tethering. Many contracts offer lots of mobile data with a reduced tethering allowance so be aware and ensure you check your data usage in Settings>Data Usage on your device.

Tethering is one of the most beneficial uses of an Android phone



Always beware of data limits when tethering with a laptop or tablet

Ask your questions

Got a problem with your Android phone or tablet?
Send it to us and we'll find the solution

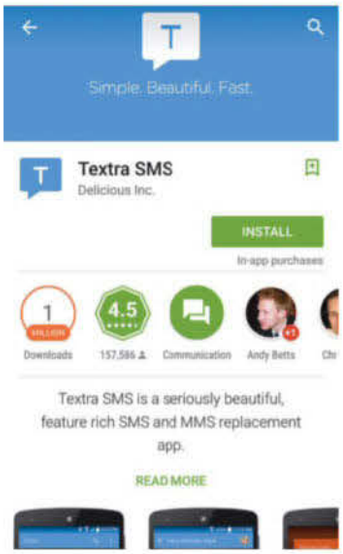
» facebook
/littlegreenrobot
Get help from our Facebook community

» email
qa@littlegreenrobot.co.uk
Send your questions for our team of experts to tackle

Where have my notifications gone?

"Do you know why I do not receive alerts when in conversation with someone on my Galaxy S5? I will see an alert from other contacts, but not from the person I am talking with which is annoying if I leave my phone for a while." ***Don Sobal***

Hi Don. From what we can ascertain, this would appear to be an Android feature that affects almost everyone, but it isn't necessarily a fault. When you think about it, the system is presuming that you are looking at your phone while a particular conversation is open and so it doesn't see the need to alert you for every message that's coming in. Imagine if you are in a deep conversation with someone where each reply is short – you would likely be annoyed if you were constantly pinged and buzzed for every message that comes in. You receive alerts for other contacts because the system presumes that you are in one conversation and that you'd like to know if someone else is contacting you. In many ways it's clever, but if you are not happy with this we would suggest to try some third party apps to see which ones will still offer you alerts. There is, however, a quicker way to deal with this and that is to make sure you back out of the conversation on your S5 before you leave your phone alone for a while. You will then receive alerts for 'every' message that comes in and you can continue as normal. No system will be perfect for absolutely everyone, but in this case we happen to think that Google really has considered the setup very carefully.



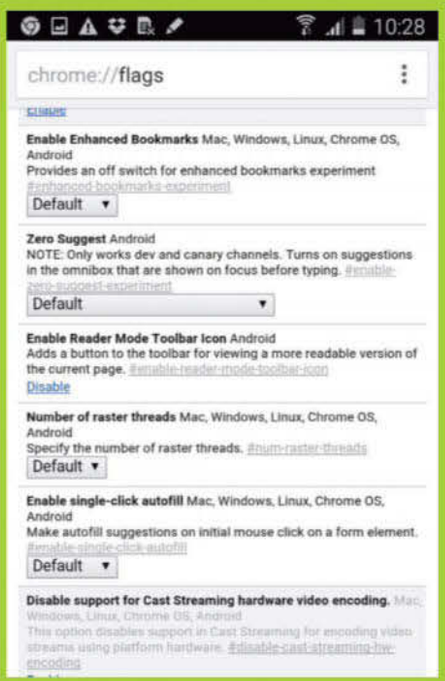
Third party apps may well solve the problem for you

hints & tips

Get more from your Android phone with our handy hints

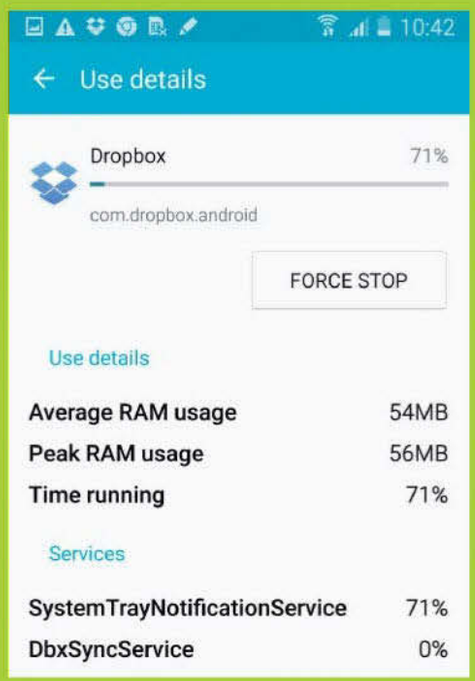
Try Chrome experiments

1 In Google Chrome, type 'Chrome://flags' into the browser bar to bring up a range of experimental features you can try. Not all are stable, but ones like the Reader Mode could change how you use your browser.



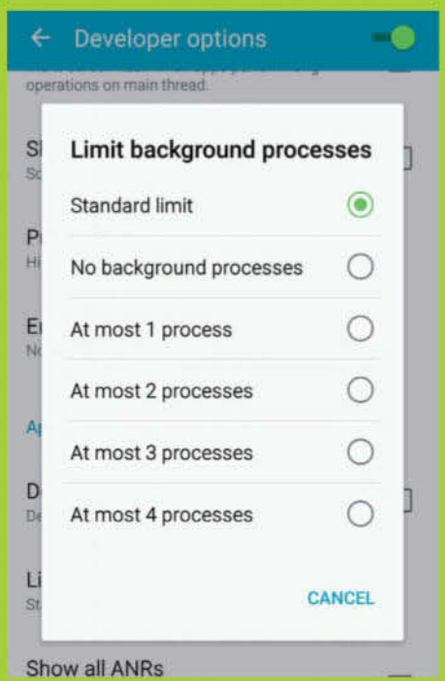
Look for memory hogs

2 If you have Developer options enabled, scroll down until you see Process stats. You can now tap on any app in the list to see how much RAM it uses and for how long it runs in the background.



Limit background processes

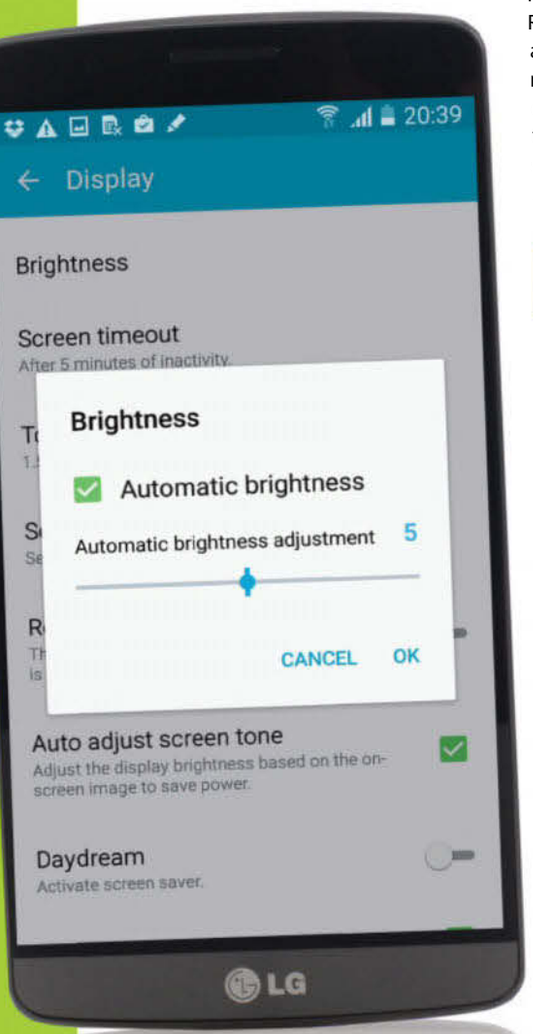
3 In Developer options, limit the number of processes that run in the background by scrolling down and selecting 'Limit background processes'. Select zero to four or select Standard limit for normal behaviour.



I don't want auto-brightness!

I like to set my screen brightness to be very low for most of the day and so have turned off the auto-brightness setting. The problem is that recently no matter how many times I turn it off, it keeps turning itself back on again. Help!
Bill Massy

A **Hi Bill.** We can start by saying that this is not normal behaviour at all and that there is nothing in the Android operating system that should cause this. You mentioned that it used to work fine which offers us a clue and barring an update to the OS itself, we will have to presume that a newly installed app is causing this behaviour. If you are able to check which apps you installed roughly when the problem started happening, you should be able to use trial and error to find the culprit. Delete as many as you can and see if the problem goes away, then reinstall them one at a time. It could be caused by a combination of apps which makes thing even more difficult, but you should eventually be able to resolve the issue once and for all.

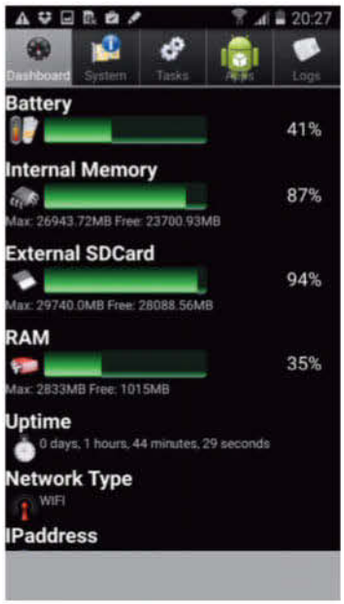


Apps can cause all sorts of strange problems on your device

Where did my RAM go?

I have recently been digging into how my Galaxy Note 3 works and noticed that there is not much RAM free. My phone can run slow at times and even using task managers has made no difference. How can I increase the amount of RAM available to speed up my device?
Martyn Lee

A **Hi Martyn.** Trust us on this when we say that you do not need to worry too much about free RAM. Your Note 3 should come with 3GB of RAM which is more than enough to run a myriad of apps simultaneously and to keep everything running smoothly. There will be occasions when it may slow down under a very heavy load, but that is perfectly normal and is something that we all see on desktop computers from time to time as well. If you spend too long looking at every single stat, you will lose time enjoying your phone and using it for tasks that are necessary. You can always stop running tasks in the Application manager in Settings and we would advise to avoid task managers as they can have little impact. We covered a similar topic in the last issue which included looking at an app called Greenify, but it does sound as though you are looking more at the numbers than the actual performance. Enjoy your Android phone and only worry if the speed drops a lot.



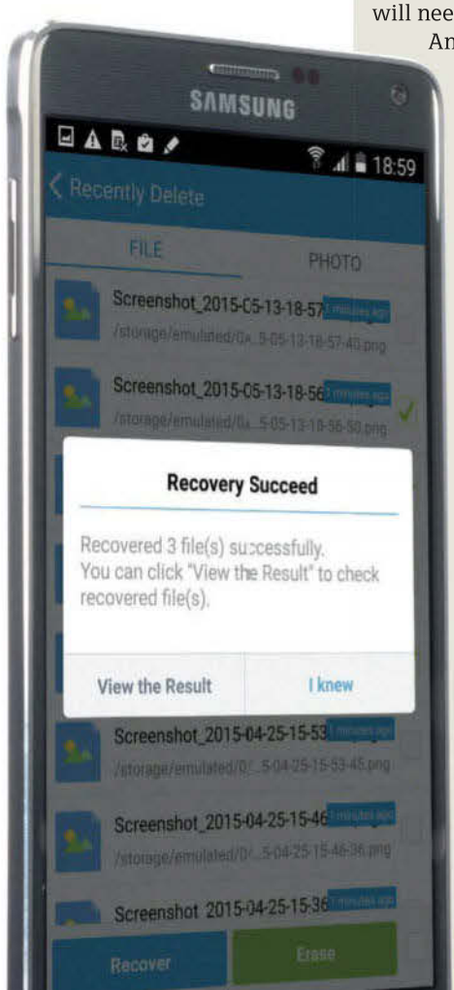
Don't worry about free RAM unless you are really suffering

> "Recovery apps that don't need root are less effective"

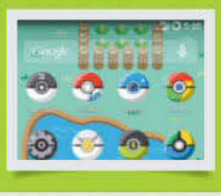
How can I recover deleted files?

A I lost some important files that I had stored on my SD card and now I can't seem to get them back. I'm not sure if I deleted them or not, but do remember deleting a batch of files and suspect that they may have been swept up in the process. Is it at all possible to get them back?
Janine Robinson

Hi Janine. If you have deleted the files there is a chance that you can get them back, but it will depend upon many things. You will need to ensure that your Android device is rooted because this gives you many more options, but if it isn't and the files were on your SD card, there are still some options open to you. We will detail these in a step by step and hopefully one will work for you to help recover the files that you need. Unlike most answers that we give, there are no guarantees that we will be successful here because dealing with deleted files is not an exact science and even those who specialist in such things cannot ever offer a cast iron guarantee. Let us know if our advice works and with a bit of luck you will be able to retrieve all of your files.



There may still be hope after you delete important files

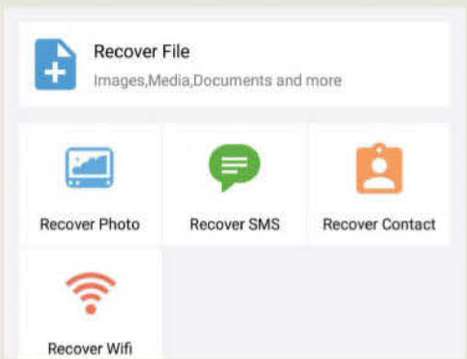


Did you know?

You don't have to live with the default icons on your Android phone or tablet. Go to Google Play and search for 'icons' to find many free icon sets that can be used in launchers such as Nova. You really can customise almost every aspect of your Android device.

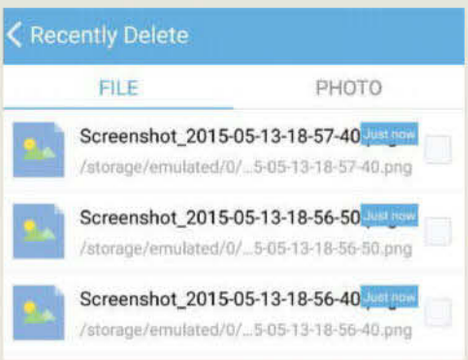
1 Get a solution

Go to Google Play, look for 'GT Data Recovery (root)', and then install it. Be aware that it requires some high-level permissions which are necessary for the task, but if this concerns you, perhaps avoid all recovery apps. Recovery apps that don't need root are less effective.



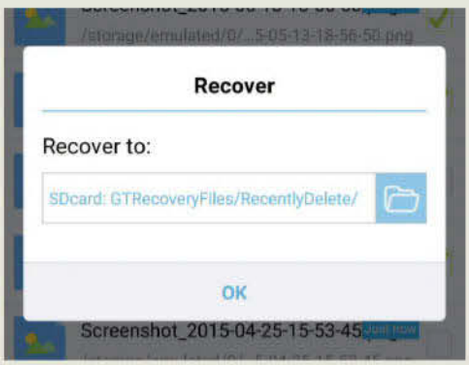
2 Scan your device

Open the app and then select the type of file that you want to restore. Not all types are supported, but if you see what you need simply tap the 'Start new scan' option. Let the scan complete and try not to open any other apps while it is running.



3 The recoverable files

When the scan is complete, you will hopefully see a list of files that can be recovered. We should highlight that the chances of success are completely random, but if you see what you want tap each to select them for restoration. The entire process is very quick and highly efficient.



4 Select a destination

You can now choose which folder to send the recovered files to and you can choose any destination. Once you have chosen a folder and tapped the green icon, you will eventually see a Recovery success message appear. The files you need should now be safely restored for your use.

5 SD card restoration

If your Android device is not rooted and the files were originally stored on an SD card, you can try recovery software such as Recover My Files which is designed to recover deleted files of any type using a Windows of Mac computer. Again, there are no guarantees, but it's worth a shot.

6 A safe future

You should always think ahead when it comes to deleting files on your Android device and the best way around this is to use a file manager that includes a trash option. File Commander-File Manager from Google Play, is a good example which could save you lots of trouble in the future.

Android magazine

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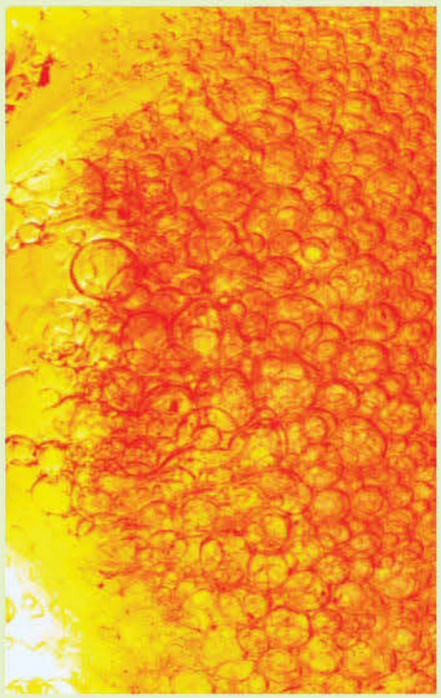

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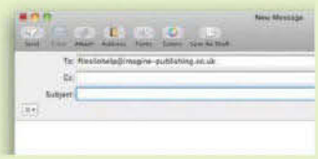

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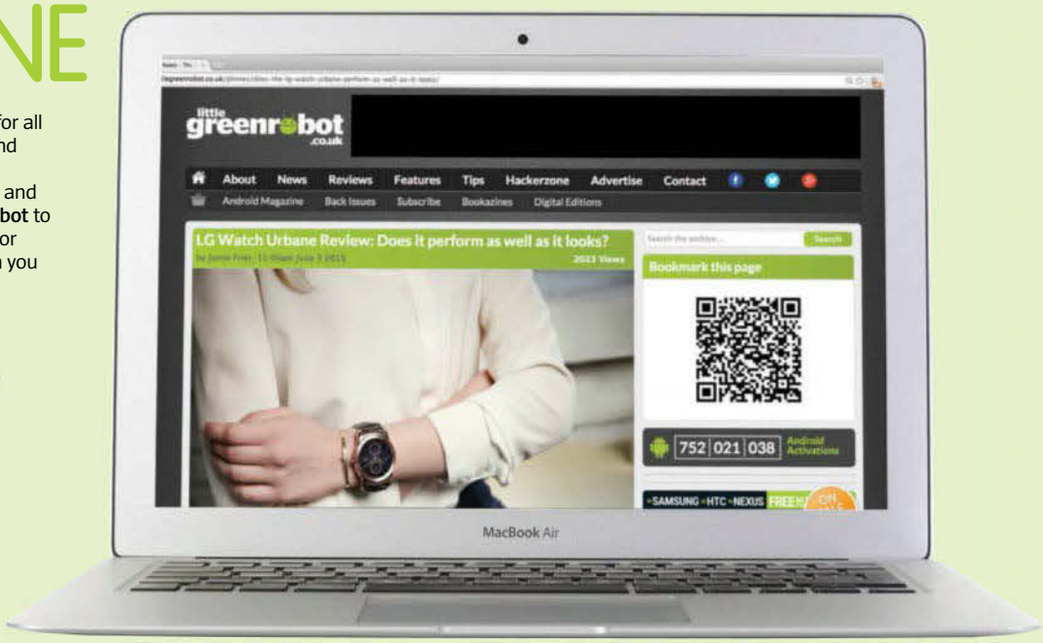

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